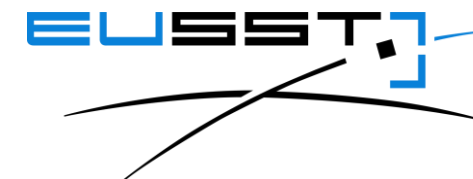




# The role of Defense in European Union Space Surveillance and Tracking



Dr Pascal Faucher, Chairman EU SST, Defense and security, CNES  
Rome, 14 November 2022

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# What is EU SST?

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## EU SST:

- Is a working example of multilateral cooperation at the intersection of space safety and space security
- Matures and expands as a fully-fledged security component of the EU Space Programme 2021-2027
- Expands towards a Partnership composed of 15 Member States of the European Union
- Has an **inherently dual governance** system in place in which civilian, military and security actors collaborate
- Must be able to operate effectively taking into account the **security** dimension and the duality of the SSA domain

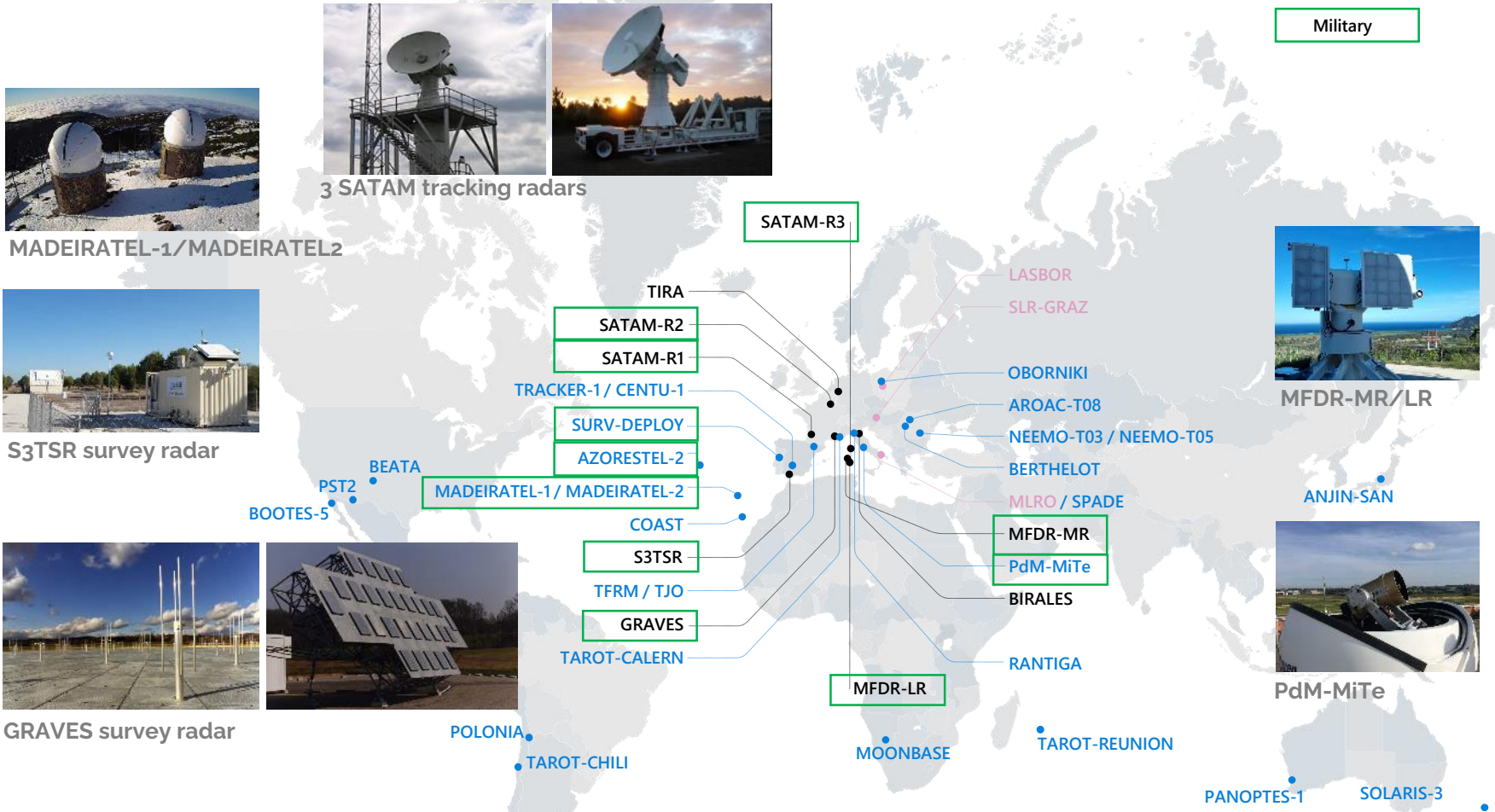
## We:

- Are fully **operational** 24/7, we deliver high quality public services to users (CA, RE, FG)
- Perform research and development of SST capabilities to improve the level of performance and **strategic autonomy**
- Foster innovation and **competitiveness** of the European industry and start-ups, we support the consolidation of a commercial ecosystem around SSA, strengthening strategic autonomy in Europe

# Partnership Agreement signed on 11 November 2022

- 2015/6/16: founders
1. **France:** Dr Philippe Baptiste, Chief Executive Officer, CNES
  2. **Germany:** Dr Walther Pelzer, Head of the German Space Agency, DLR
  3. **Italy:** Ing. Giorgio Saccoccia, President, ASI
  4. **Spain:** Mr. Francisco Javier Ponce Martínez, Director General, CDTI
- 2018/12/27: 1st enlargement
5. **Poland:** Prof. Dr hab. Grzegorz Wrochna, President, POLSA
  6. **Portugal:** Mr. Vasco Manuel Dias Costa Hilário, Director General, **DGRDN, Ministry of National Defense**
  7. **Romania:** Dr. Fiz. Marius-Ioan Piso, President and CEO, ROSA
- 2022/11/11: 2nd enlargement
8. **Austria:** Dr. Henrietta Egerth-Stadlhuber and Dr. Klaus Pseiner, Managing Directors, Austrian Research Promotion Agency (FFG)
  9. **Czech Republic:** Mr. Martin Kupka, Minister of Transport, Ministry of Transport (MDCR)
  10. **Denmark:** Colonel Henrik Hegner Nielsen, Chief of Staff, **Air Command Denmark, Royal Danish Air Force**
  11. **Finland:** Dr. Jussi Kaurola, Director General, Finnish Meteorological Institute (FMI)
  12. **Greece:** Prof. Emmanouil Plionis, Director and President of the BoD of NOA, National Observatory of Athens (NOA)
  13. **Latvia:** Ms Līga Lejiņa, Ministry of Education and Science of the Republic of Latvia (IZM)
  14. **Netherlands:** Mr. Micky Adriaansens, Minister, Ministry of Economic Affairs and Climate Policy
  15. **Sweden:** Mrs. Anna Rathsman, Director-General, Swedish National Space Agency (SNSA)

# Operations - 12 military sensors



- 3 Lasers
- 9 Radars (2 surveillance, 7 tracking)
- 28 Telescopes (18 surveillance, 10 tracking)

Dual approach which enables the use of sensors of different origins: **scientific, military and commercial**

**Crucial contribution of military sensors which account for 95% of measurements shared in EU SST (88% from GRAVES and 6% from S3TSR)**

EU SST network is regularly evolving, see <https://www.eusst.eu/about-us/>

# Service provision - 3 operational public services



## Collision Avoidance (CA)

Risk assessment of collision and generation of collision avoidance alerts

### Key features

- **User-tailored** service (SCD)
- Hot redundancy scheme involving ES (S3TOC) and FR (COO) with harmonised service level and single service provider per registered user
- Enhanced **Analysis & Risk Mitigation** support (e.g. covariance estimations, HBR estimations, PoC sensitivity analysis, CAM support)

## Fragmentation Analysis (FG)

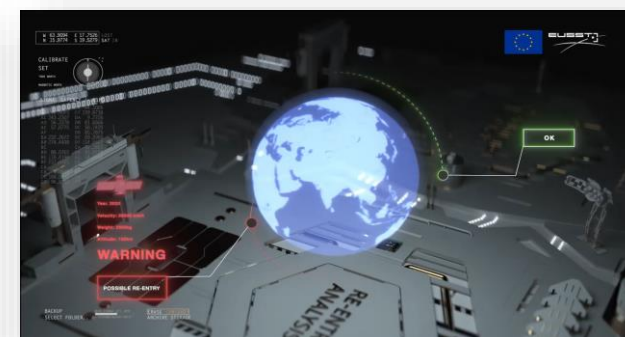
Detection and characterisation of in-orbit fragmentations

- Provided by IT (C-SSA)
- Short-term notification to **confirm quickly an FG event**
- Medium-term FG analysis based on the orbital parameters of the **catalogued fragments** e.g. Gabbard Diagram
- Long-term FG analysis (**with simulations with breakup model**)

## Re-entry Analysis (RE)

Risk assessment of space objects re-entry into the Earth's atmosphere

- Provided by IT (C-SSA)
- Long-term (within 30 days) **re-entry predictions**
- Short-term (a few days) overflight predictions with **ground tracks over customisable areas of interest**




# Service provision - Users



**> 150 ORGS**  
22 EU MS

**Collision Avoidance**

**43 ORGS**



**> 310 Satellites**

**Fragmentation Analysis**

**> 125 ORGS**

**Re-entry Analysis**

**> 125 ORGS**



The collision avoidance service will be open **worldwide** as of 1 January 2023, following a progressive and ramp up approach

# Service provision - 20 military satellites



**311**  
Satellites

## LEO

**129**

BIROS  
SAR-LUPE 1, 2, 3, 4, 5  
TANDEM-X  
TERRASAR-X  
TET-1  
CHEOPS  
METOP B, C  
SENTINEL 1A, 1B, 2A, 2B, 3A, 3B, 5P, 6A  
PAZ  
Brik-II  
DEIMOS 1, 2  
FossaSat 2E1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13  
ION-SCV 1, 2, 3, 4, 5  
NEMO-HD  
NEPT-1  
Reaktor HW,  
Sunstorm, W-CUBE  
Spartan, Platform 1, 2  
Suomi-100  
TRISAT  
UPMSat-2

VENμS  
SARAL  
CSO-1, 2  
CERES 1, 2, 3  
CALIPSO  
JASON 3  
PLEIADES 1A, 1B  
SMOS  
XR-1, ICEYE-X1, 2, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 24  
ANGELS  
EYESAT  
BRITe PL-1, PL-2  
Odin, GMS-T, MATS  
GomX-4A, 4B  
NESS  
Robusta 1B  
ELO3  
YAM-2, 3

Globalstar M065, M066, M069, M070, M071, M072, M073, M074, M075, M076, M077, M078, M079, M080, M081, M082, M083, M084, M085, M086, M088, M089, M090, M091, M092, M093, M094, M095, M096, M097

## MEO

**58**

GSAT / Galileo  
0101, 0102, 0103, 0104, 0201, 0202, 0203, 0204, 0205, 0206, 0208, 0209, 0210, 0211, 0207, 0212, 0213, 0214, 0215, 0216, 0217, 0218, 0219, 0220, 0221, 0222, 0223, 0224

O3B PFM, O3B FM 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, mPower 1, 2, 3, 4, 5, 6

ALPHA

CELESTA, MT-Cube-2

TRISAT-R

## GEO

**124**

COMSATBW-1, 2

XTAR-EUR

SPAINSAT

METEOSAT-8, 9, 10, 11

HYLAS 1, 2, 4

ASTRA 1KR, 1L, 1M, 1N, 1G, 2A, 2C, 2D, 2E, 2F, 2G, 3A, 3B, 5B

AMC 1, 3, 4, 6, 8, 11, 15, 18, 21

SES 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16/Govsat-1, 17, 18, 19, 20, 21, 22

NSS 6, 7, 9, 10, 11, 12

SIRIUS 4, QUETZSAT 1, CIEL 2

EDRS-C

ATHENA-FIDUS

SYRACUSE 3A, 3B, 4A

HELLAS-SAT 2, 3, 4

INMARSAT 3F1, 3F2, 3F3, 3F5, 4F1, 4F2, 4F3, AF1, 5F1, 5F2, 5F3, 5F4, GX5, 6F1

EUTELSAT 10A, 16A, 172A, 21B, 28A, 28B, 36B, 3B, 5WA, 65W, 7WA, 70B, 7A, 7B, 8WB, 9A, 9B, HB 13B, 13C, 13D, KASAT 9A, 12WB, 172B, 7C, 5 WEST B, Konnect, Quantum, KVHTS, HB13F, HB13G, E10B

BULGARIASAT-1

AMAZONAS 2, 3, 5, HISPASAT 30W-5, 30W-6, 36W-1, 74W-1

Commercial

**220**

Govern./IGOs

**63**

Military

**20**

Universities / Research

**8**



# Service provision - CZ-5B re-entry by IT MoD Center

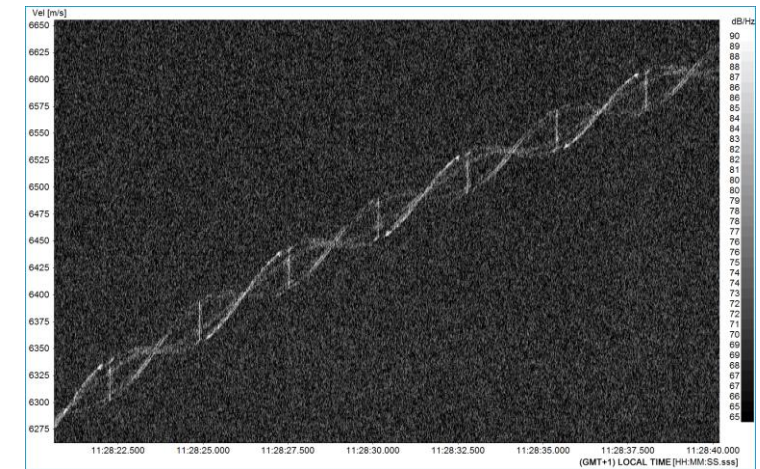
- **31 October 2022 – 4<sup>th</sup> launch of a Long March 5B rocket**
  - **Uncontrolled re-entry of core stage CZ-5B R/B: about 30 m long, 17-23 tons**
  - **No deorbit burn performed**, as in the three previous instances (May 2020, May 2021 and July 2022)
  - Similar target orbit (Mengtian space station module):
    - 41.57° inclination → **±41.57° latitude band (southern Europe affected)**
- **EU SST re-entry campaign**
  - **On-call operational teams activated**
  - **EU SST sensors network** tasked to follow the event (fast confirmation of tumbling state – on launch day)
  - First short-term prediction published approx. T-3 days before re-entry. Updates daily/twice a day until re-entry

**SPACENEWS**  
4 Nov 2022

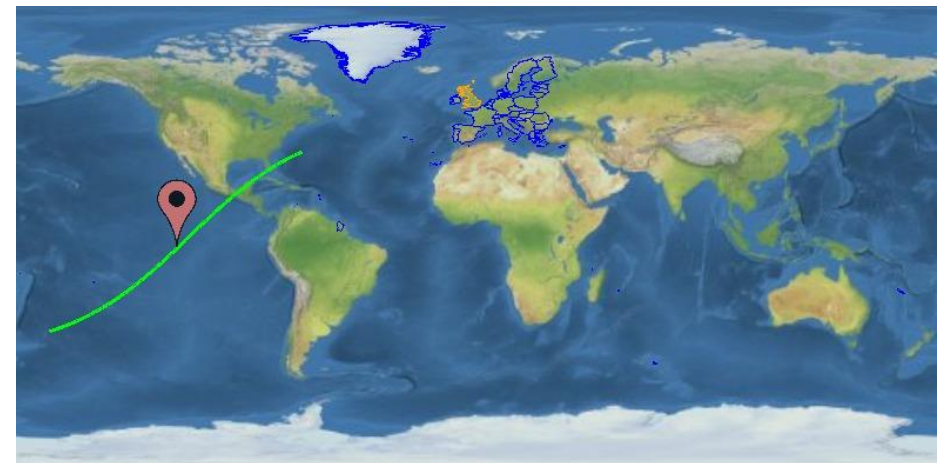
The stage reentered over the Pacific Ocean but not before causing issues for air traffic in Europe, due in part to the uncertainty in predicting reentry events.

A section of airspace over northern Spain was closed early Friday based on a **bulletin** issued by the European Aviation Safety Agency (EASA) Nov. 3 based on predictions from the EU Space Surveillance and Tracking (EUSST). France also **closed airspace** south of Corsica from 9:30 to 10:30 a.m. local time.

Velocity Time Intensity plot - tumbling speed of 5 sec. per rev. (MFDR)



Ground track map: CZ-5B R/B Decay Report





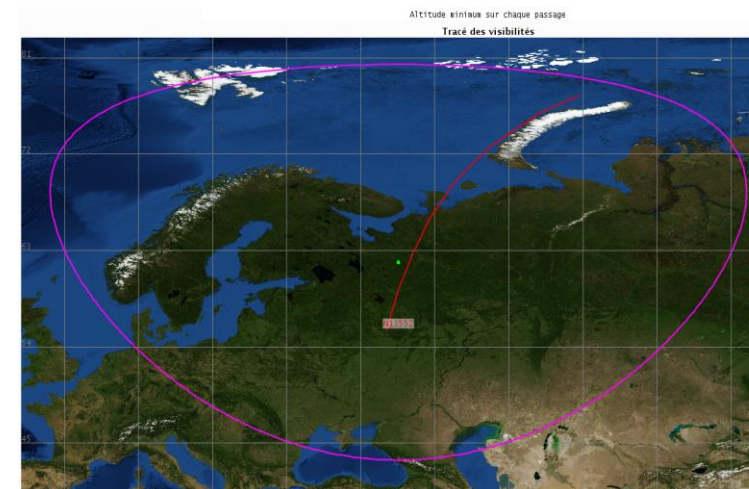
# Service provision - ASAT fragmentation by IT MoD Center

## ■ ASAT took place on 15/11 2021 likely ~2:47am UTC

- Launch from **Plesetsk**
- 1982-092A #801 **Kosmos 1408 (Tselina-D #38)**
  - Russian electronics and signals intelligence (ELINT) satellite
  - 465 x 490 km orbit, 82.5° inclination
  - > 2000 kg, inactive for decades

## ■ EU SST quickly reacted, monitored & informed on the event

- Sensor network tasked to follow event, gather measurements
- Important contribution of the **FR MoD GRAVES radar** (50 fragments detected in the first hours)
- Regular communication to COM/HaDEA/EEAS
- Information release in social media on 16/11



Thierry Breton  
@ThierryBreton

The European Space Surveillance and Tracking System (#EUSST) was immediately activated and has been #monitoring the situation on a permanent basis to #protect European satellites (Galileo and Copernicus) and those of the Member States from any danger of debris collision.

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15/11 4:15

EU SST surveillance radars **detect a fragmentation event in the LEO regime.** Break-up of object **COSMOS 1408** is confirmed at 9:44 after further analysis.



15/11 9:21

**EU SST Taskforce is activated** to coordinate the monitoring and communication of major SST events. The EU SST sensors network is tasked to **follow up fragments.** EU SST users are informed.



16/11 9:00

EU SST contributing sensors provide data and confirm the **detection of a cloud of fragments** from COSMOS 1408.



**Kinetic ASAT**

The debris cloud is linked to the kinetic anti-satellite (ASAT) weapon test reported by external sources. The ASAT event likely took place on 15/11 at 2:47.

All times are UTC.

# The Security Committee (SEC)

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## Security Committee (SEC):

- Includes representatives from the **ministries of defense** and **national security authorities**, with observers from Commission and EU SPA
- Is responsible for the preparation and approval of **security-related policies, procedures and deliverables**, and oversees the implementation of policies
- Oversees all matters relating to **data security** and **operational risk**
- SEC is finalizing a revised **Data Policy** and **Security Classification Guide**, and is contributing to the **Risk and Threat Analysis** and **General Security Requirements**

# Security and Data Policy



- EU SST already provides a **globally unique framework for multilateral SSA/SST data sharing** between **civil and military** actors: joint **operational data sharing platform** and **forthcoming European catalogue**
- A revised **Data Policy** to guide the growing exchange of data and information between 15 Member States in the frame of the Partnership is currently being finalized, with participation of MoDs and NSAs
- This new Data Policy lays the foundation for **handling and sharing classified SST data and information** in the upcoming Partnership activities
- Addressing the need to provide the collision avoidance service to military satellites, while adequately **protecting security interests** (e.g. through anonymization)

# Summary: the role of defense in EU SST

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- EU SST systematically **integrates and leverages civil, military and civil-military contributions** from the participating member states, including sensors, operations centers and personnel
- The **governance model** allows for **addressing and preserving sovereign security interests** of the participating member states within a civilian framework. Security and data policy aspects are handled by the EU SST Security Committee
- As part of the European Union Space Programme, the configuration of EU SST has proven **well equipped for the complex interactions** between a diverse set of actors at the intersection of space safety and space security that is key to the success of any future multilateral SSA or STM initiative
- EU SST ensures that sovereign security concerns are addressed through the **participation of the national security stakeholders and ministry of defense representatives**
- EU SST's data policy must consider a **complex architecture of bilateral SSA data sharing agreements**, which are typically concluded at the level of the ministries of defense

# Conclusions



- EU SST considered as the **operational capability** for the EU STM approach (cf. **Joint Communication on STM**)
- Europe is very far from autonomy in SST capabilities for security and defense. Therefore, priority is to develop a **strategic autonomy** in space surveillance and tracking of space objects in all orbit regimes.
- Priority is also to rely more and more on our **vibrant and energized commercial industry and start-ups ecosystem** in Europe, contributing to strategic autonomy
- EU SST has an inherently **dual governance structure**, competent on security topics such as sharing of SST data
- Lack of funding considering the tremendous challenges ahead of us. In the current geopolitical context, **additional resources** are necessary to face current and future security threats
- We need to exploit synergies between **civil and defense**, avoid unnecessary duplications, and join forces in order to improve the level of European strategic autonomy
- EU SST is **available to foster synergies with EDF on SSA**



# Thank you

**User Registration**  
<https://portal.eusst.eu>

**General Information**  
[www.eusst.eu](http://www.eusst.eu)

