

# The Space Debris Challenge – ESA's Response

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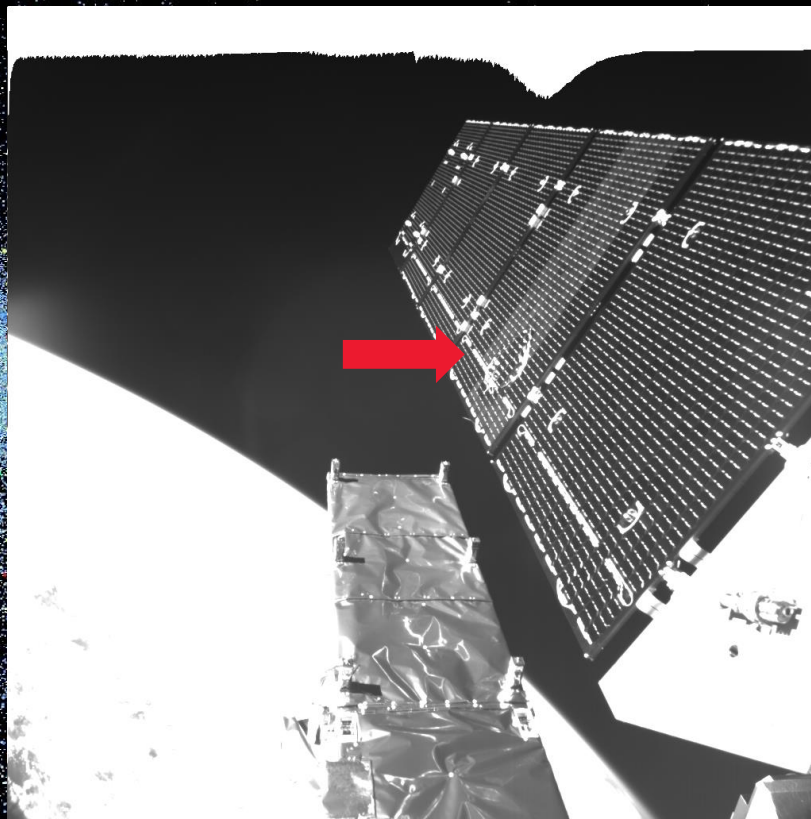
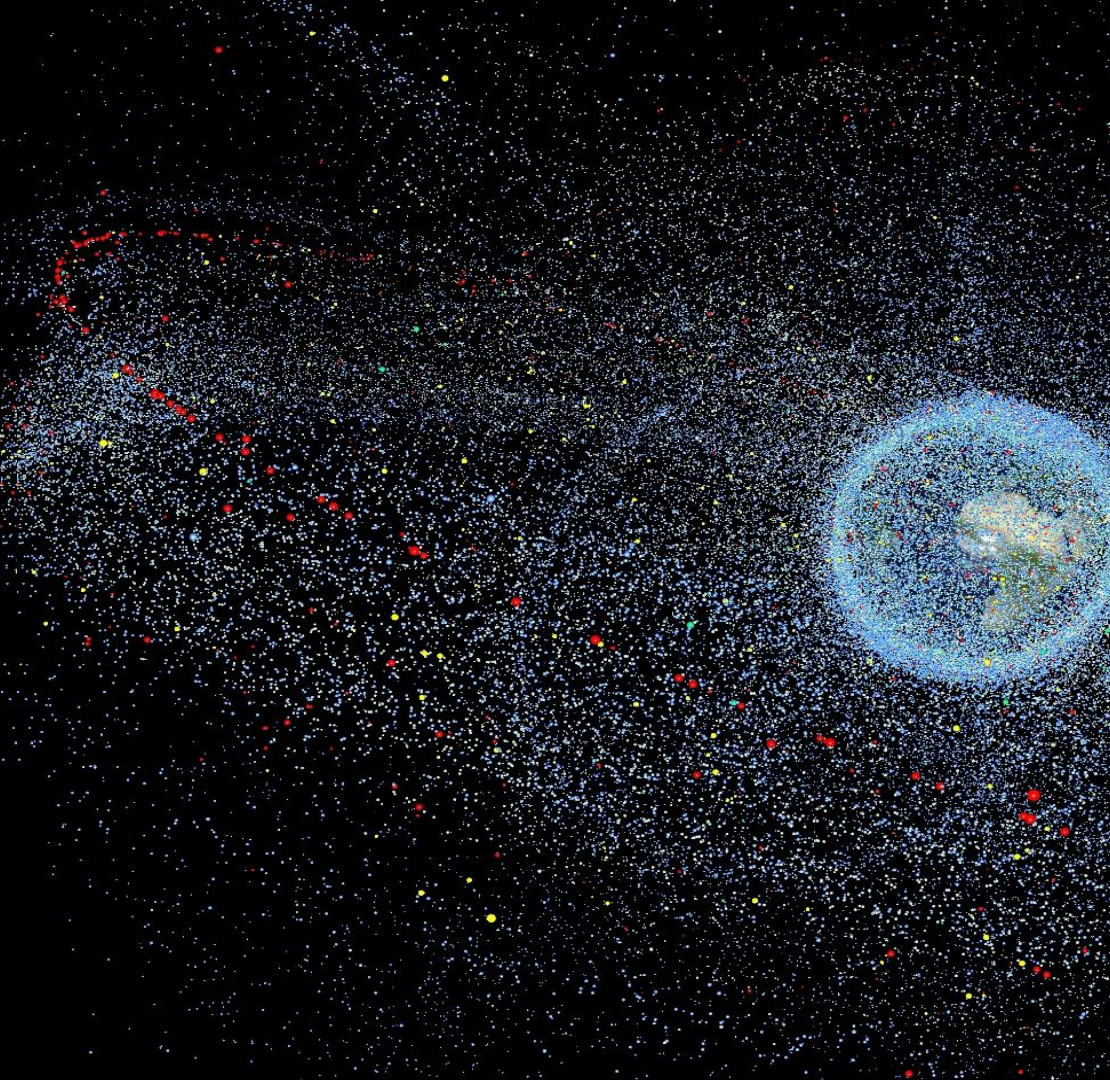
**June 2, 2022**

**Ensuring the Sustainability of Outer Space**

**Holger Krag, Tim Flohrer, Luisa Innocenti, Rosario Nasca, Alexander Soucek**



**>1mm**



# Tracked Population

Statistics on space debris at



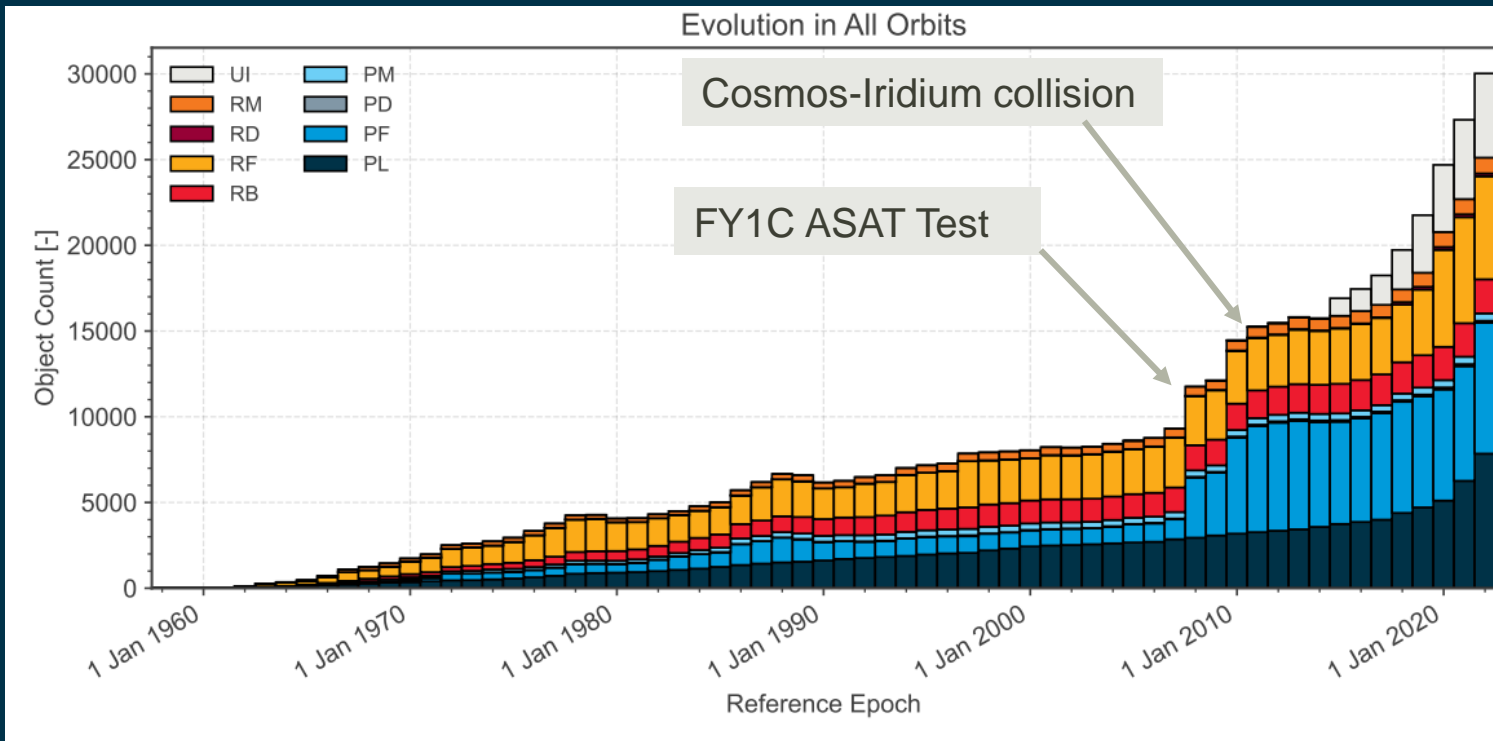
30,000



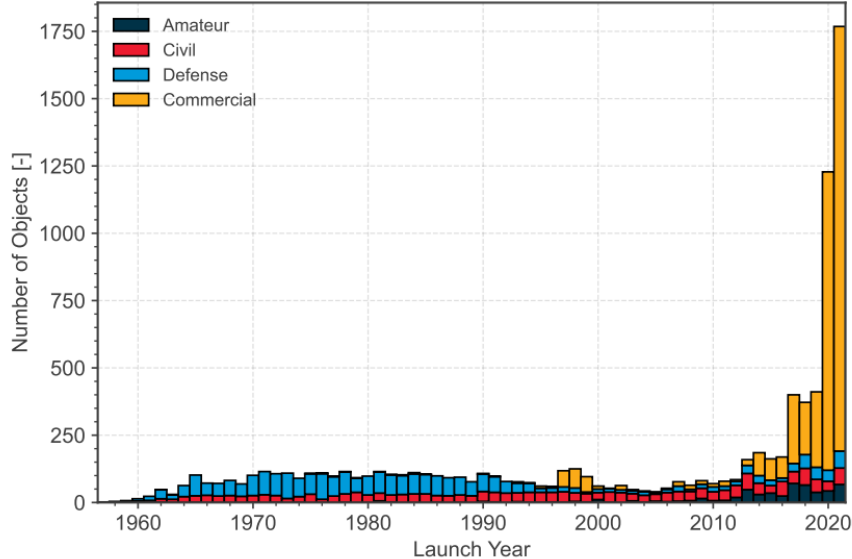
9,900t



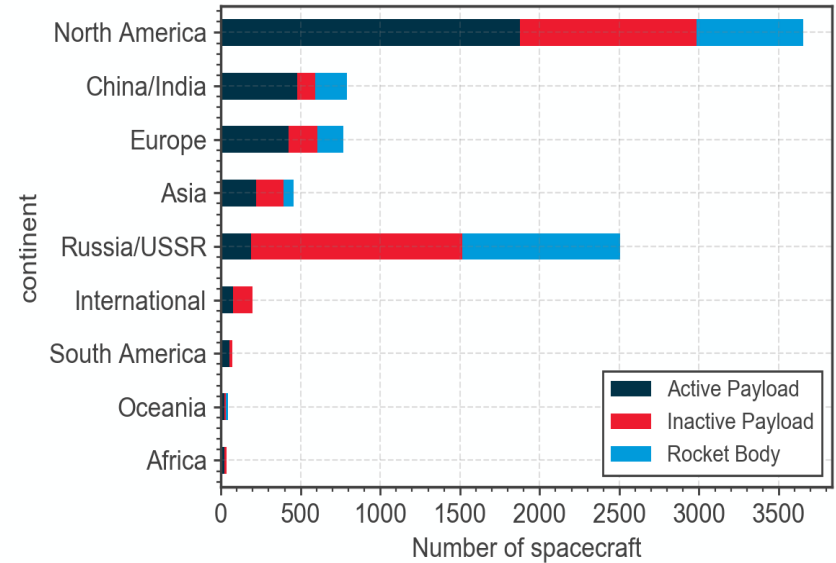
88,000m<sup>2</sup>



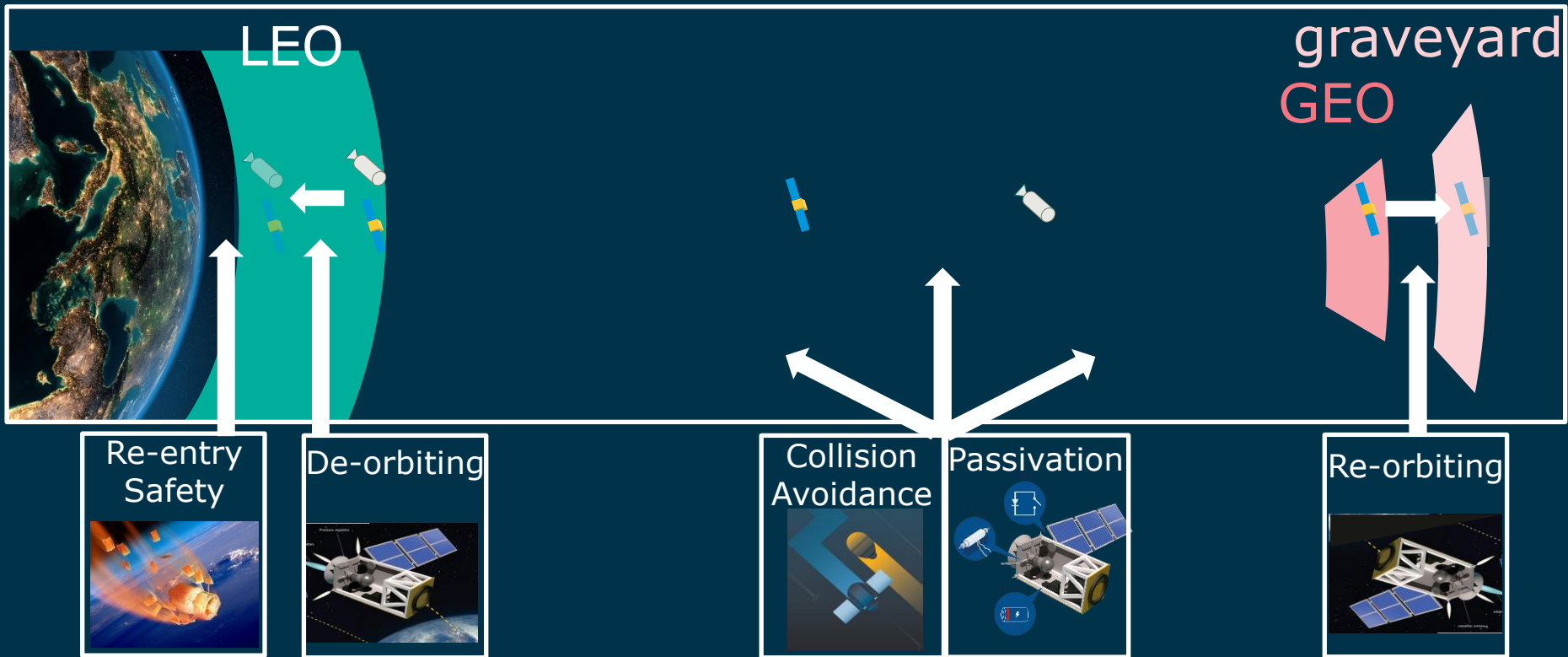
Payload Launch Traffic into  $200 \leq h_p \leq 1750\text{km}$



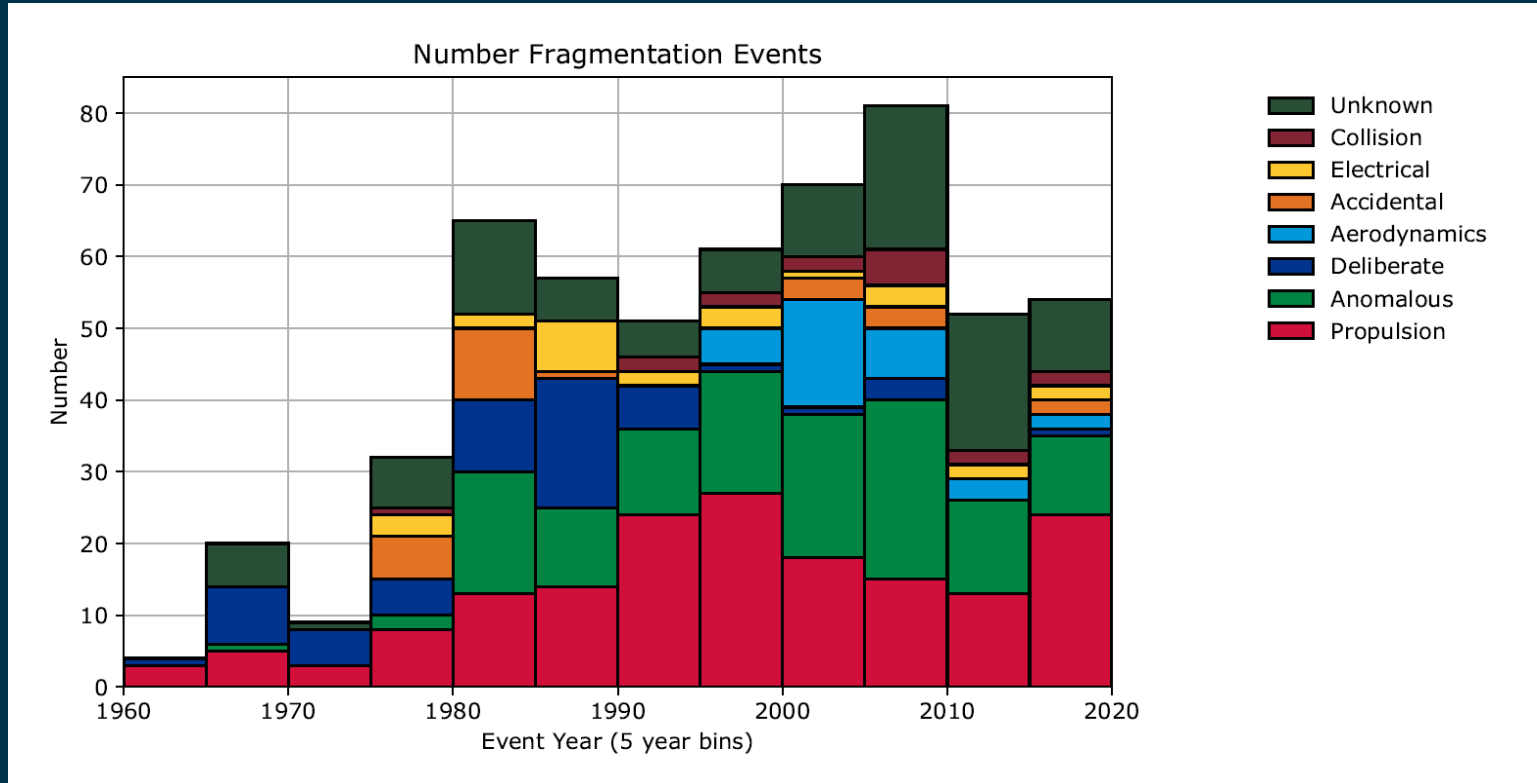
2021



# Mitigation of Space Debris

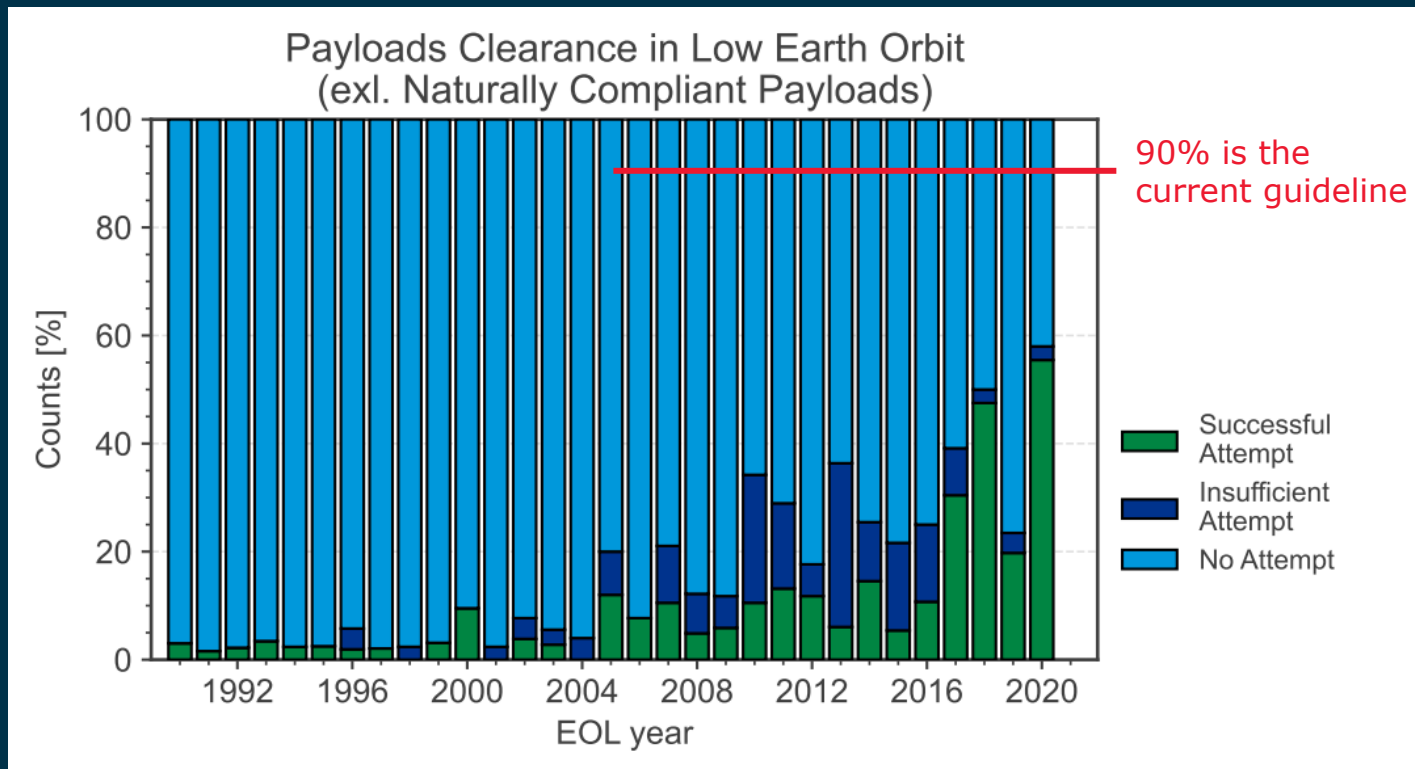


# Break-Ups in Orbit Today



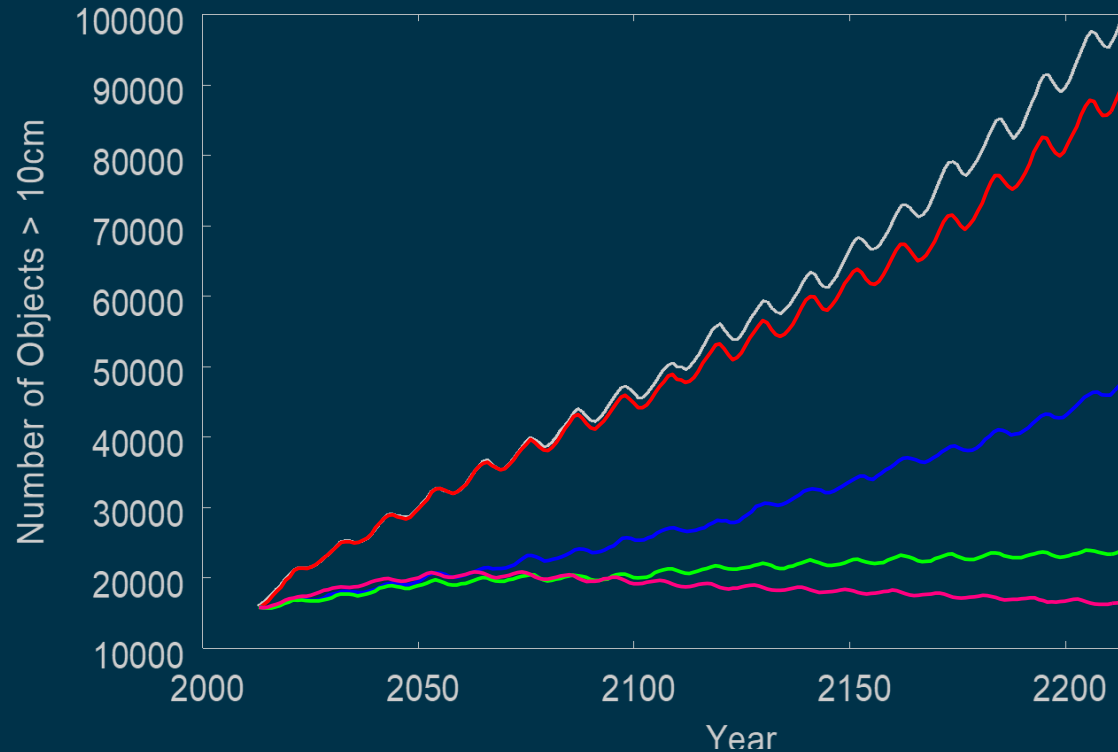


# Post Mission Disposal Today



# Effectivity of Measures

Effectiveness of Mitigation Measures



No mitigation

Extrapolation of our current behaviour

100% Passivation

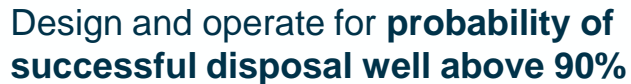
100% Passivation + 90% Post Mission Disposal

100% Passivation + 90% Post Mission Disposal + ADR (5 objects per year)

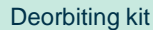


## Implementation Steps

## By 2030



## Current focus

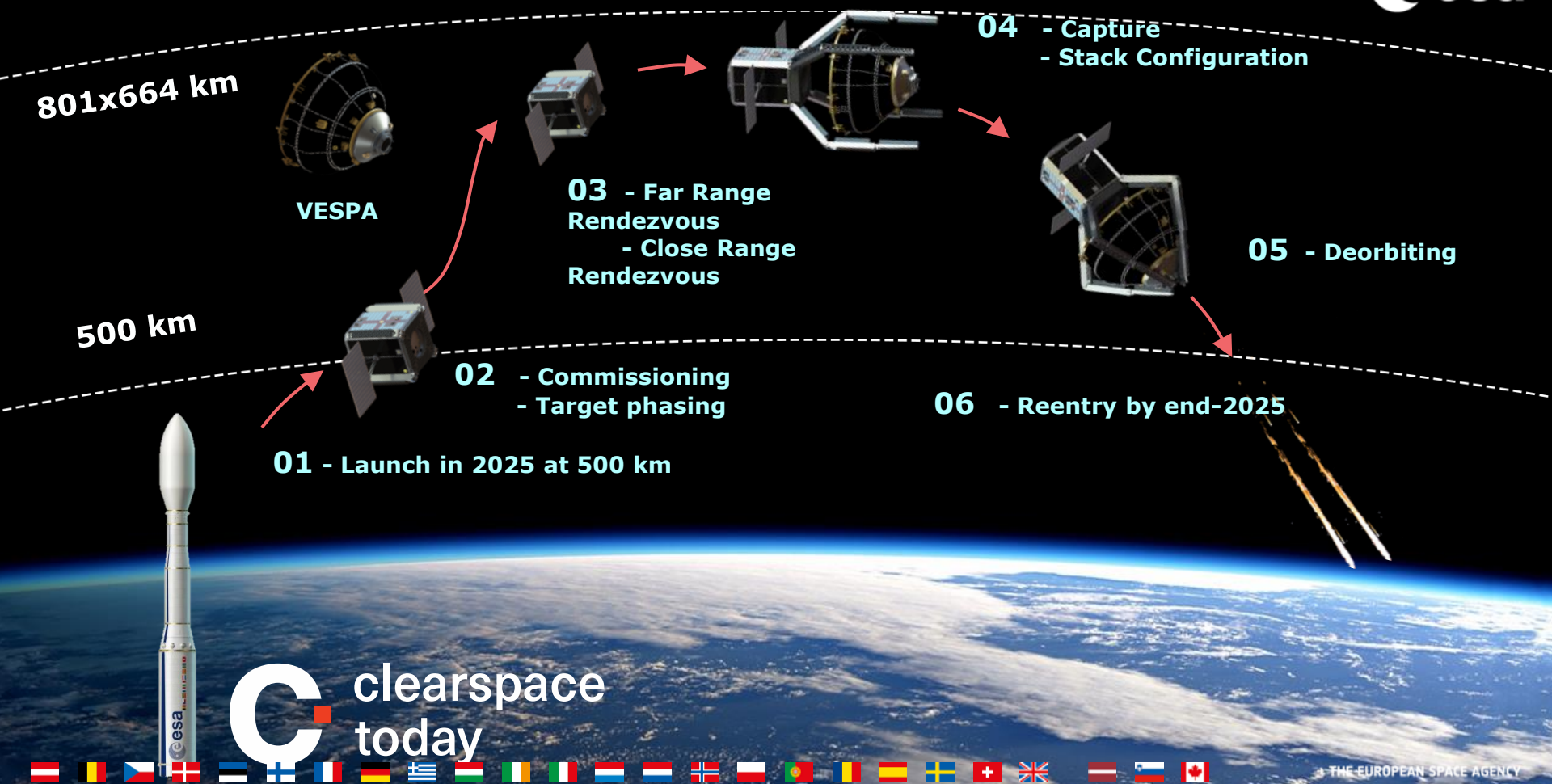


## Debris Removal as a Service



- + Removal in case of in-orbit failure
- + Suppression/removal of mission-related objects

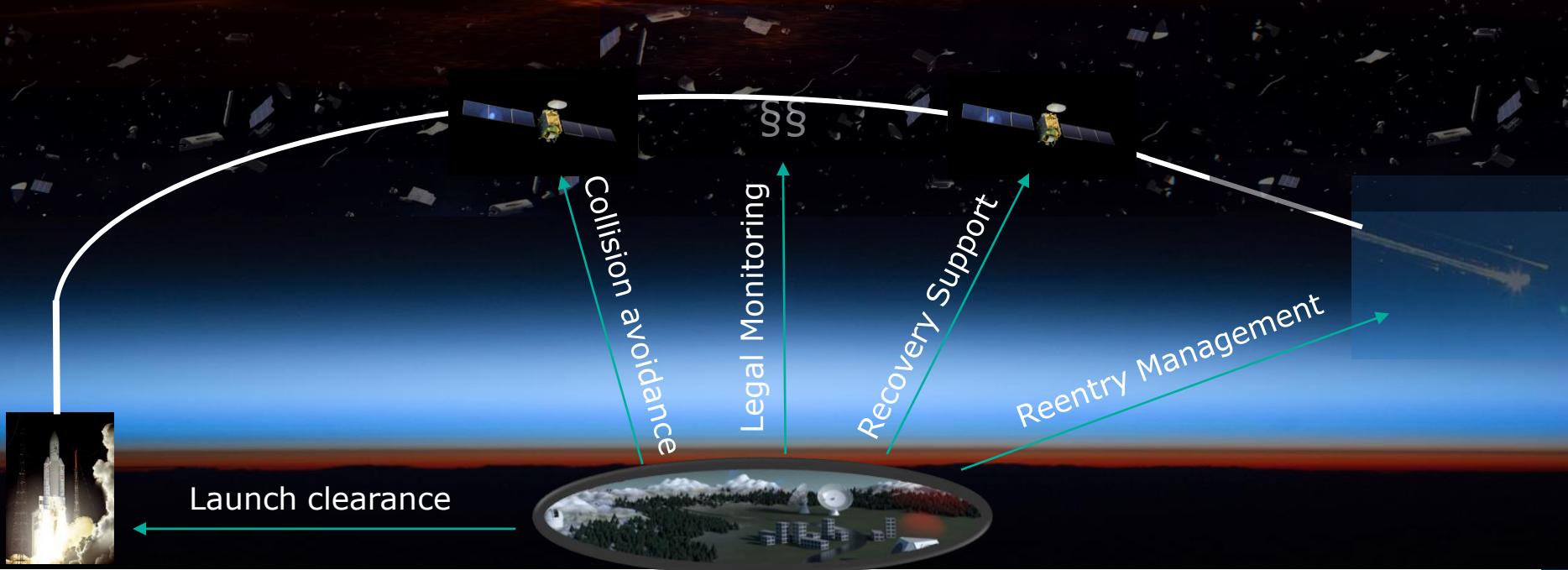
# ClearSpace-1 Mission



**C** clearspace  
today



## Space Weather Forecasts



# Collision Avoidance

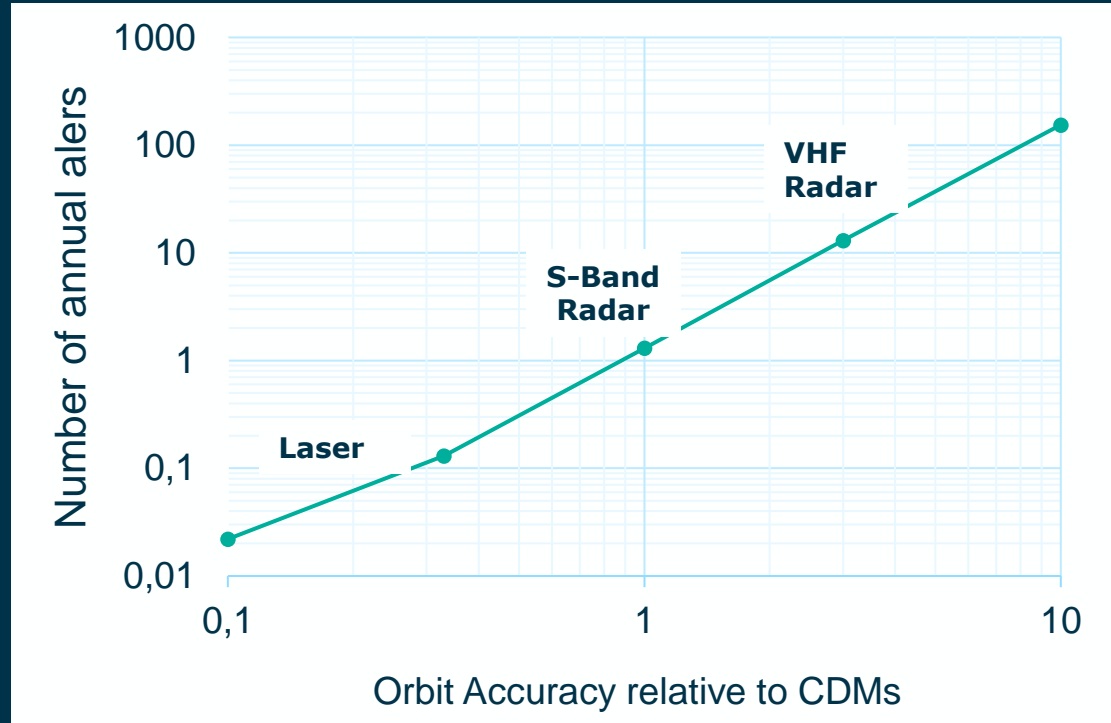
Sentinel-1B

CZ-4B third stage (L-14B) fragmentation

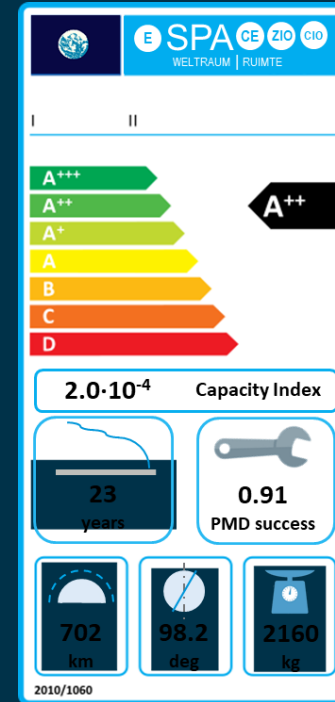
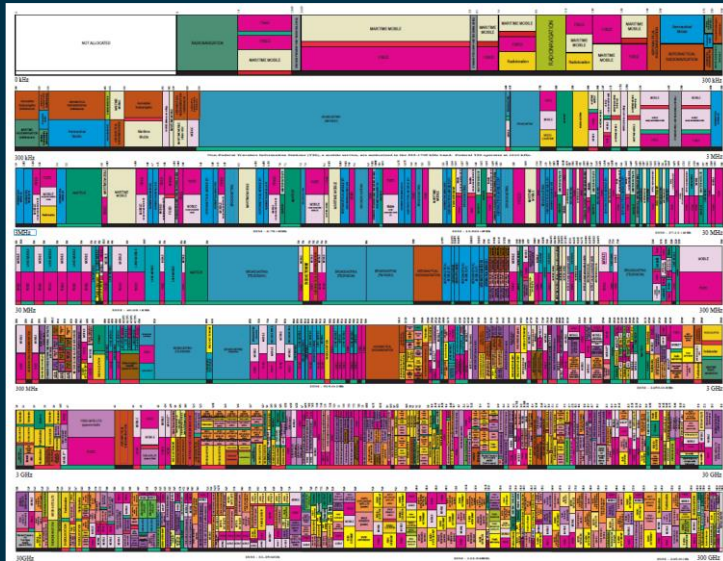




# A New Aspect of SST



**Capacity:** typology & orbital regimes of artificial space objects compatible with a **stable evolution** of the environment



# Thank You!!

