

COMET OPS et SIL

Tableau de bord stratégique

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Surveillance de l'espace



SHARE MY SPACE



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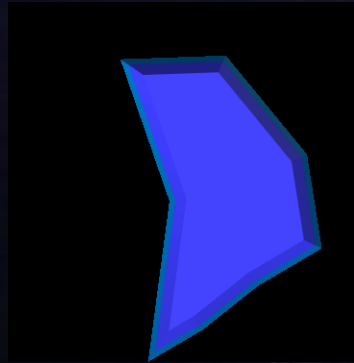
nicolas.frouvelle@csgroup.eu

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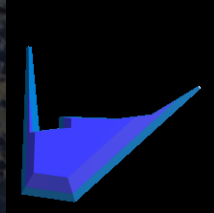
arnaud.lecarvennec@csgroup.eu

2023-03-30

EARTH ORBIT IS GETTING CROWDED



46 000
> 10cm



1 000 000
1-10cm



100 km/h
BOWLING BALL

Only

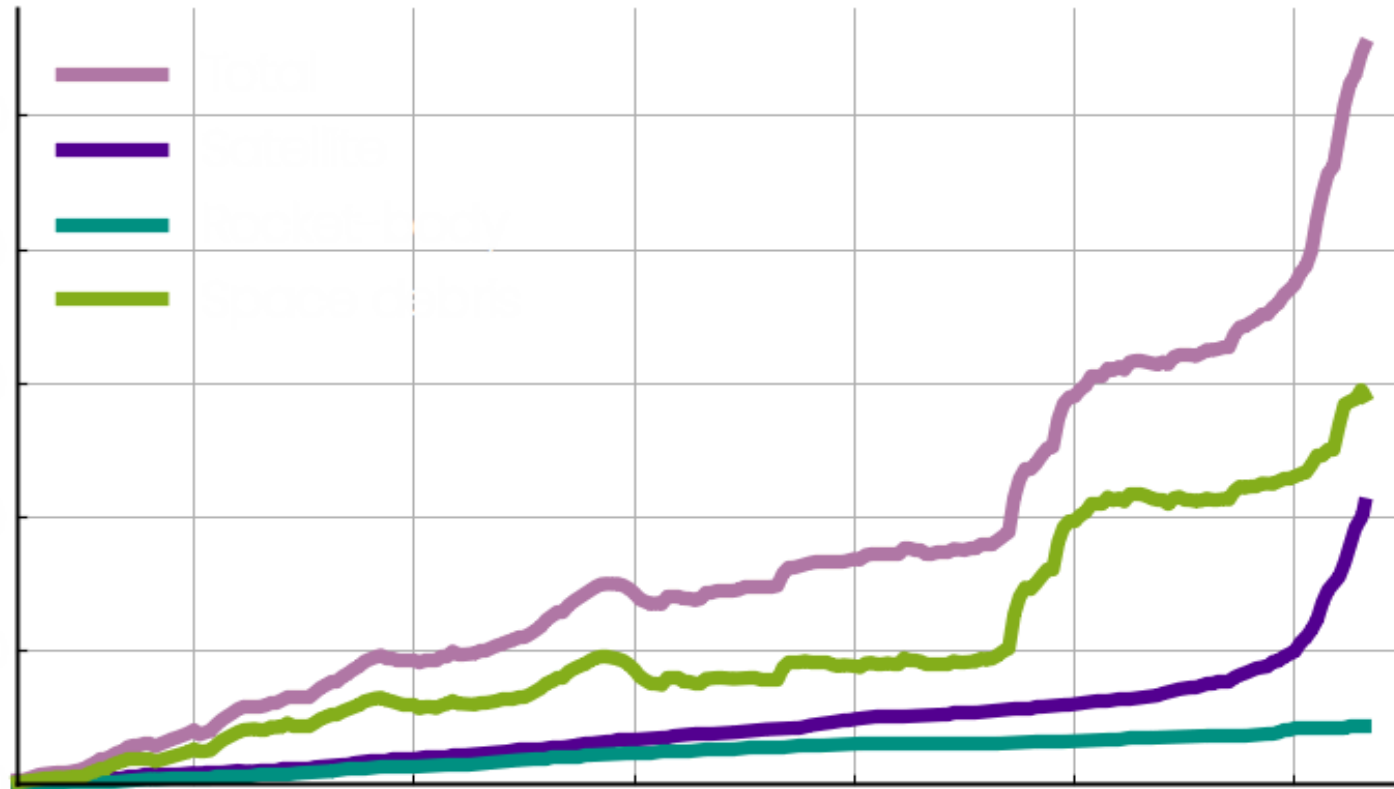
3% ARE
TRACKED

WE ARE NOWHERE CLOSE TO A SOLUTION

Current space situation

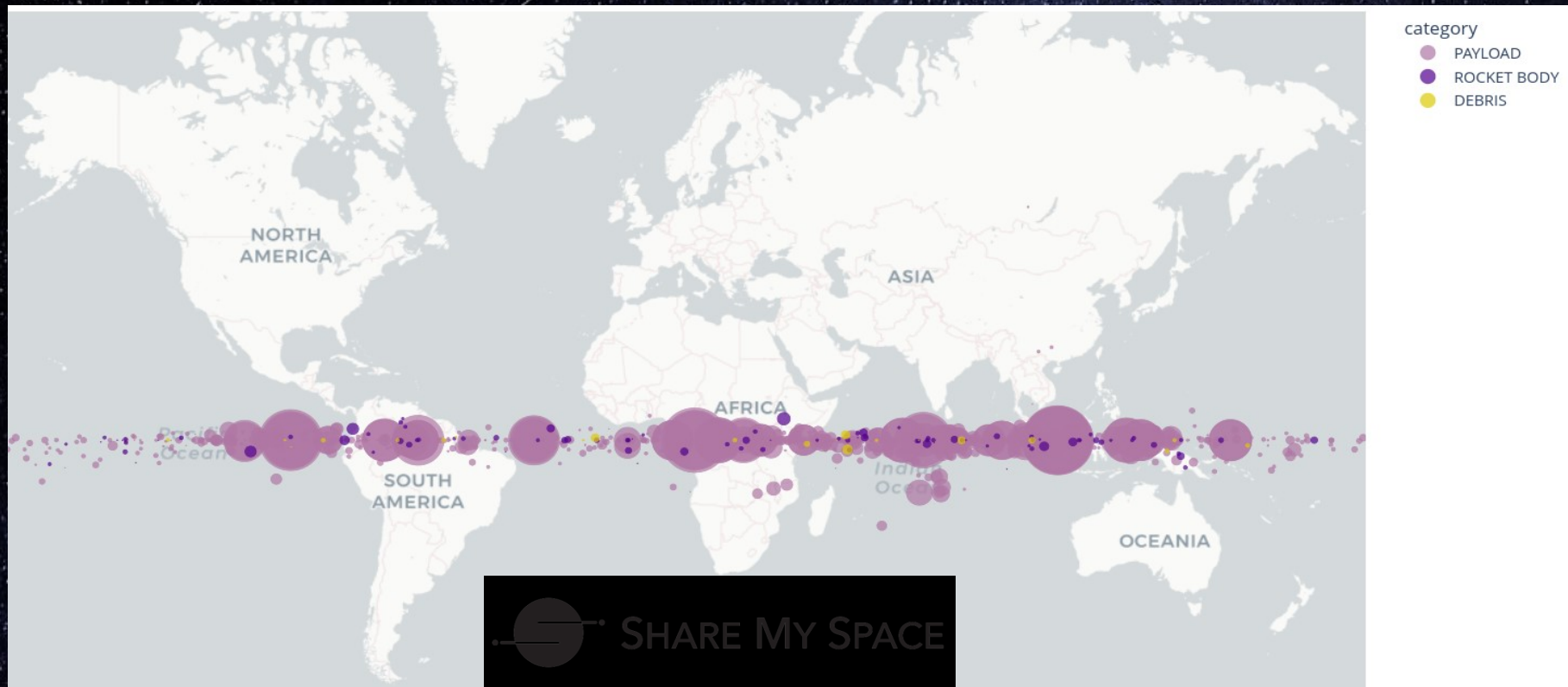
More and more objects...

Number of resid



Current space situation

... means more and more dense orbits



BETTER DATA - BETTER DECISIONS

Share My Space Surveillance Capabilities...

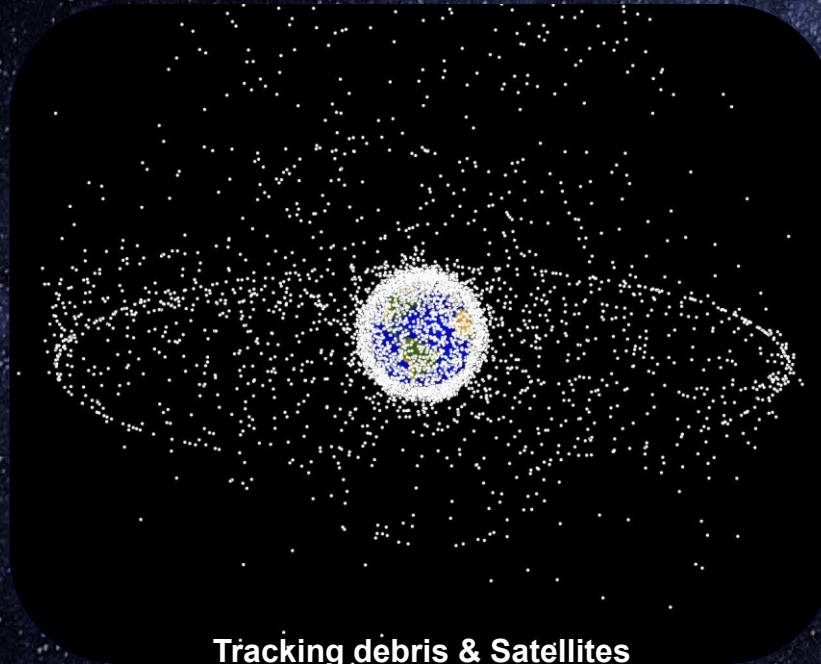
DATA FUSION

All IN LEO, MEO, GEO



DYNAMIC MAPPING

Data Fusion & Catalogue



SOLUTIONS

Safety & Security

Collision Avoidance

Accurate tracking

Attitude assessment

Heterogeneous data

... deals with a lot of data type and format

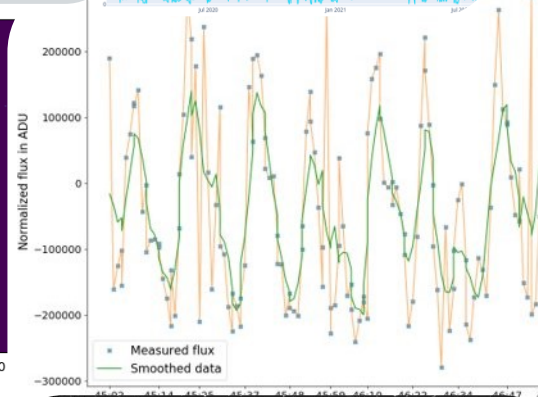
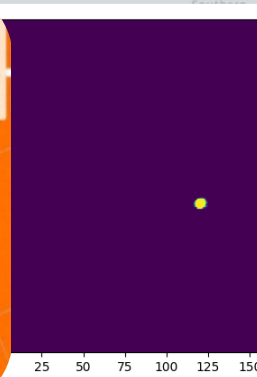
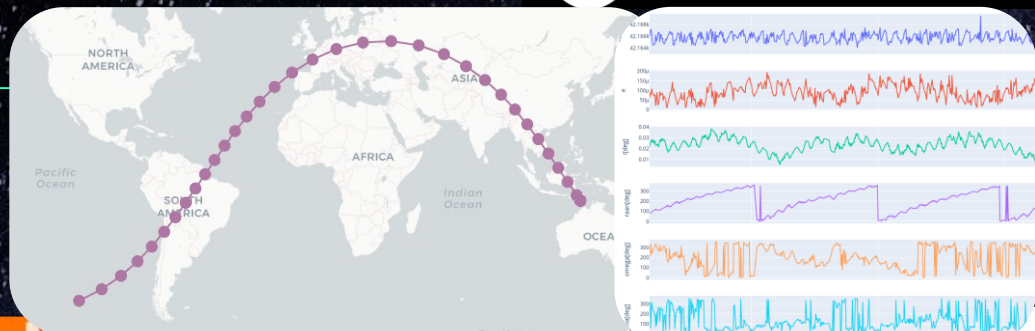
- **State vectors**, or TLE for trajectory representation
- **Light curves** from raw images for attitude characterization
- **Maneuvers** dataset
- **Conjunctions** dataset
- **Metadata**

SWARM A (39452)
Estimated total risk: $7.51e-3$

SWARM B (39451)
Estimated total risk: $2.45e-5$

SWARM C (39453)
Estimated total risk: $4.75e-4$

Jan 05 12:00 Jan 06 12:00 Jan 07



Current data situation

A growing number of objects
means more and more data to:

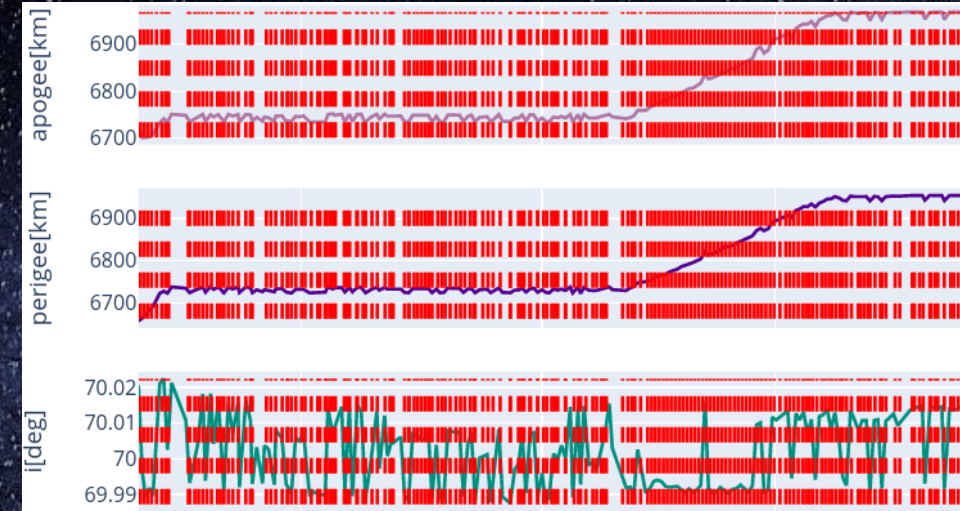
*acquire, format, ingest, clean,
process, filter, store, consume,
visualize, etc.*

Current data situation

Everyday at Share My Space...

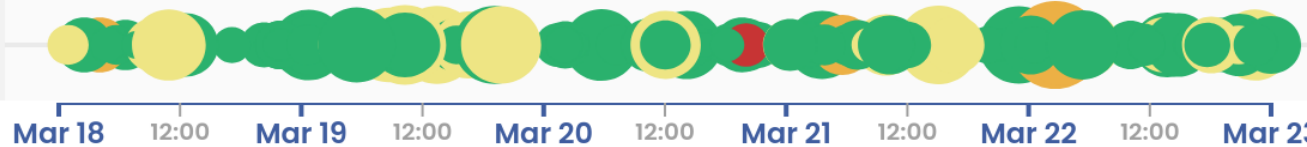
150,000+ Conjunction Data Messages produced

2,000+ Maneuvers detected



ELSA-D (47944)

Estimated total risk: $4.04e-4$



How will it evolve by **2030? 2050?**

How to **visualize** this amount of data to take wise decision?



THE SMART FUTURE
FOR A SAFER, MORE INTELLIGENT AND
BETTER PROTECTED WORLD



COMET OPS 6
SMIS



SMIS - SPACE MISSION INTELLIGENCE SYSTEM



- › Nouvelle architecture logicielle segment sol
- Dualité civile-militaire
- Gestion et sécurisation des données
- Visualisation spécifiques SST
- Architecture micro-services modulaire et gestion des fenêtres de visus
- Extensibilité
- Etat des lieux et perspectives

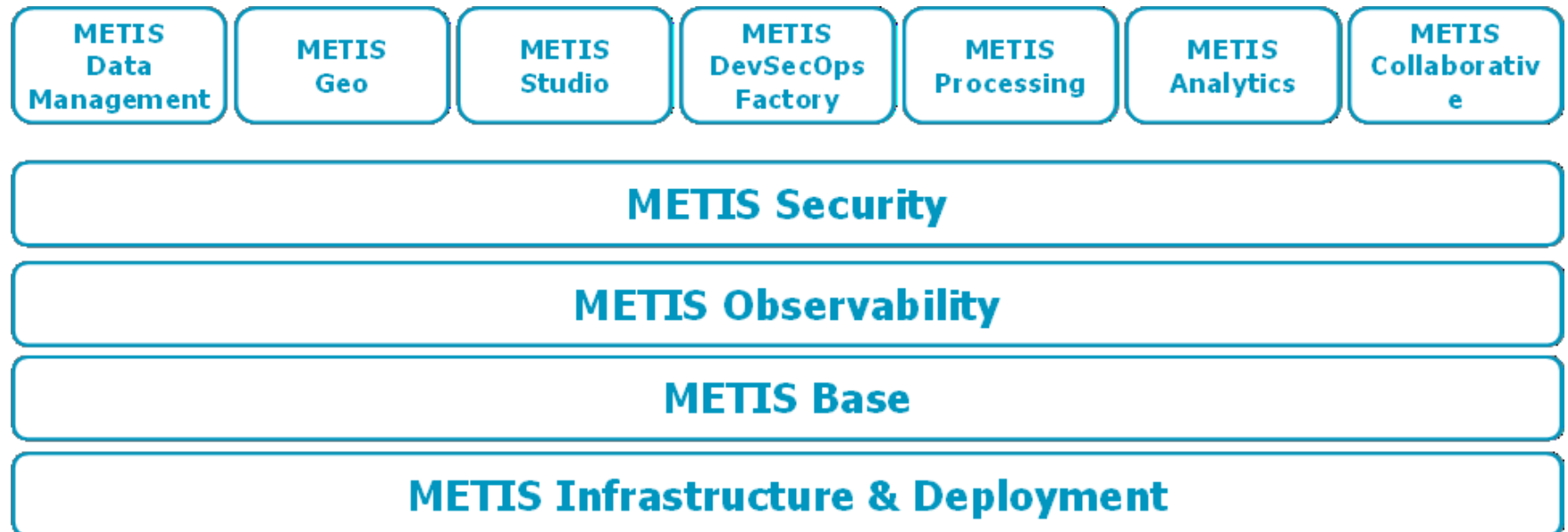


GESTION ET SÉCURISATION DES DONNÉES

- Agnosticité à la donnée (SST et autres)
- Gestion gros volumes de données, cloud, IA
- Post-Traitement
- METIS
- Performances
- Sécurisation

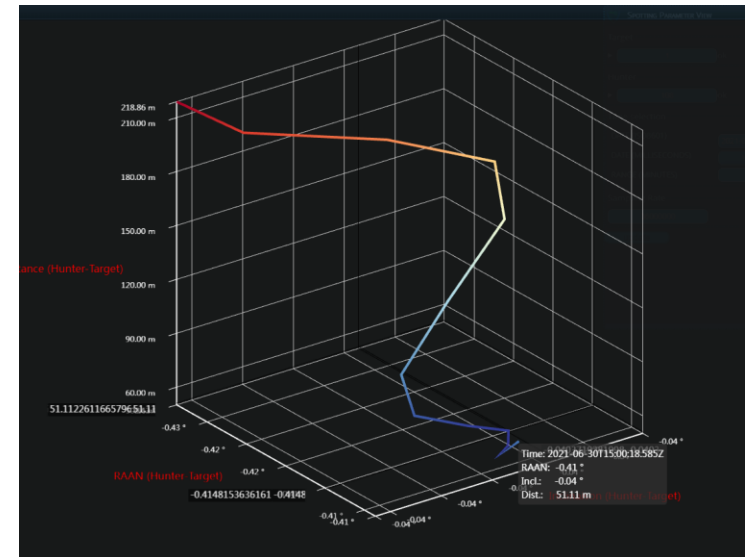
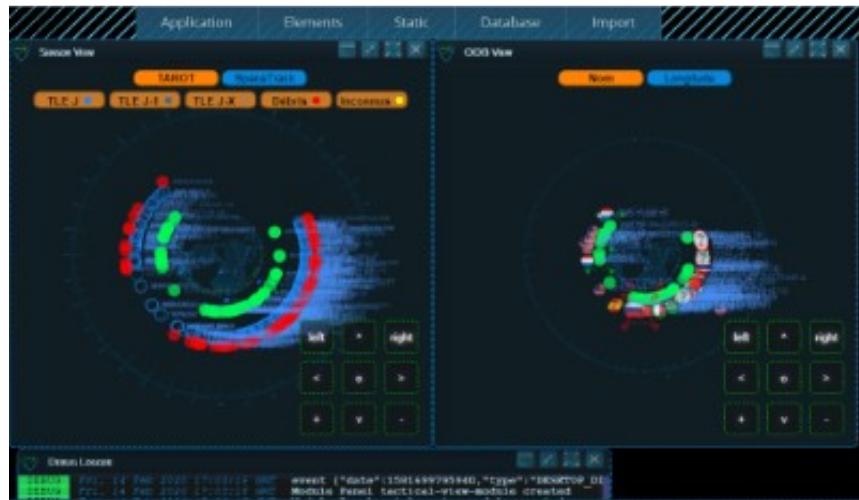


METIS

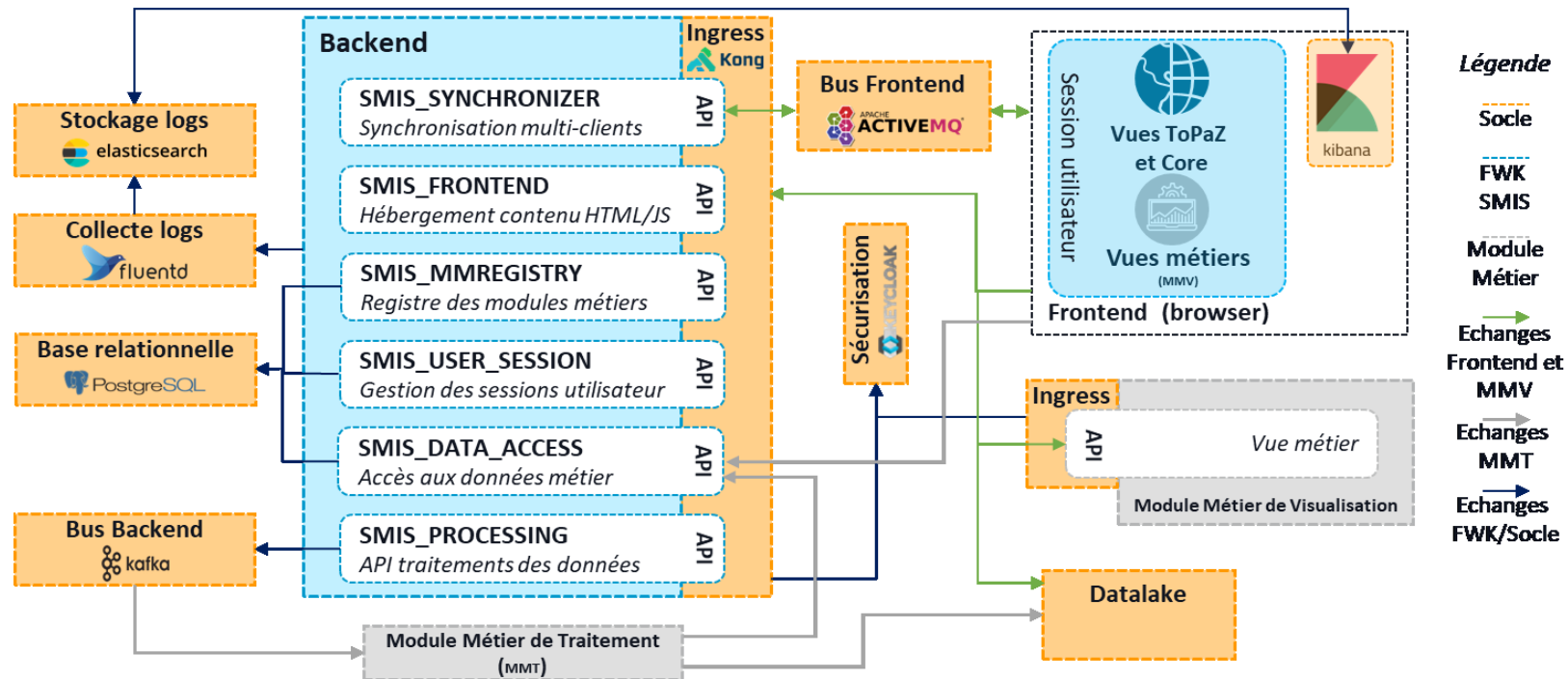


VISUALISATIONS SST

- Vue senseurs
- Vues stéréographiques polaires
- Vues rapprochements
- Focus satellite / voisinage d'un satellite
- Type de satellites / missions



ARCHITECTURE MICRO-SERVICES



- › Architecture orientée micro-services
- › Encapsulation de modules métiers : de traitement ou de visualisation
- › Couche de visualisation : ToPaZ

ETAT DES LIEUX ET PERSPECTIVE

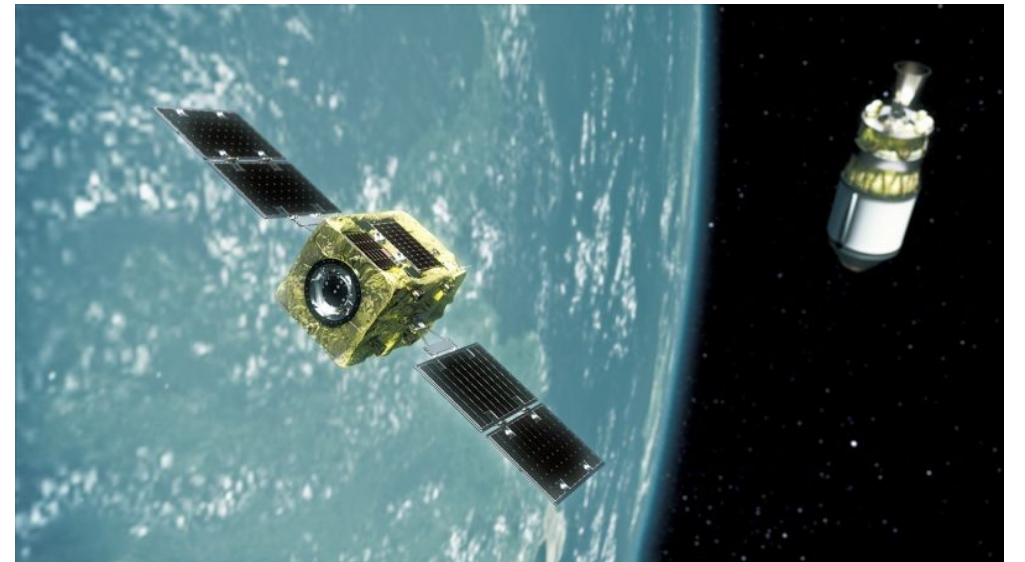
› En Cours

- ASTERX -> Mode simulation / exercices
- SIS-NEXT -> vers un C4OS
- ESSOR -> gestion et distribution multi- données



› Perspectives

- In orbit services
- Space Traffic Management
- Constellations



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Thanks for your attention!



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