

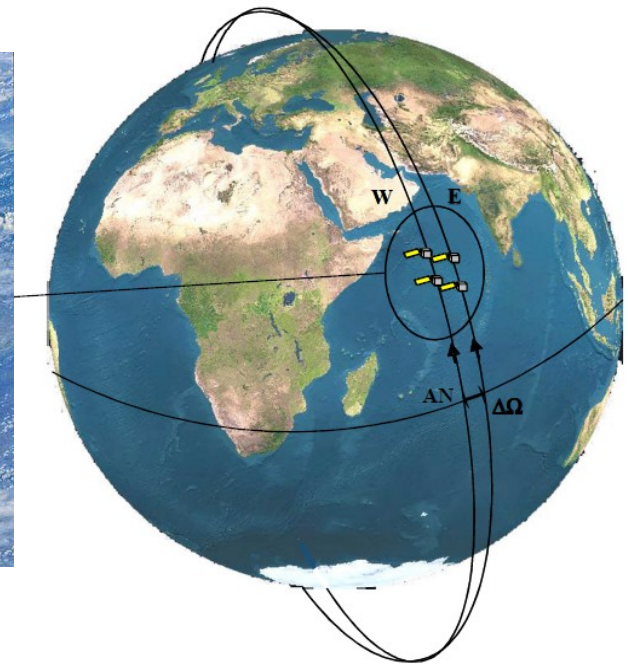
Example of end of life for formation flying satellites

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Introduction to ELISA mission

- ❖ Design based on MYRIADE platform
- ❖ 4 satellites flying in formation
 - 2 orbital planes: East and West (equatorial distance of 300 km)
 - $a \sim 700\text{km}$, $i \sim 98\text{deg}$
 - \sim SSO with MLTAN around 22h
- ❖ Satellite Characteristics at end of life
 - Total mass around 120 kg
 - Maneuvering limitation on W23 : only radial DV
 - Altitude lowering maneuvers up to 10km per thrust



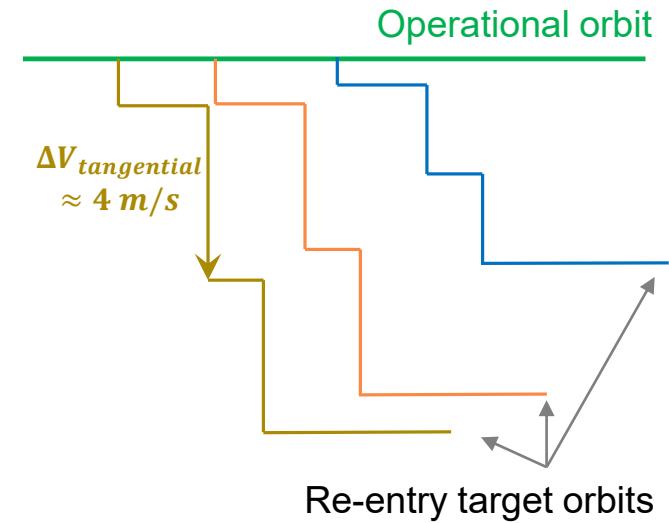
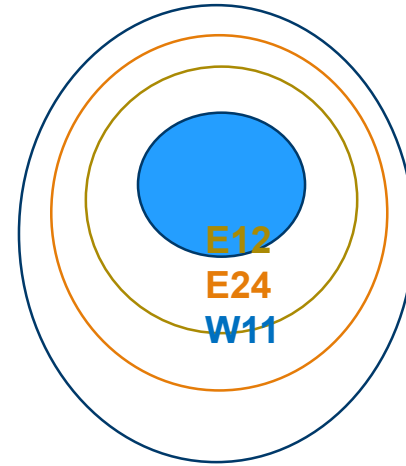
Two different types of maneuver

Dispersions based on Myriades platform:

- $3\sigma_{mag} = 10\%$
- $3\sigma_{dir} = 6.5 \text{ deg}$

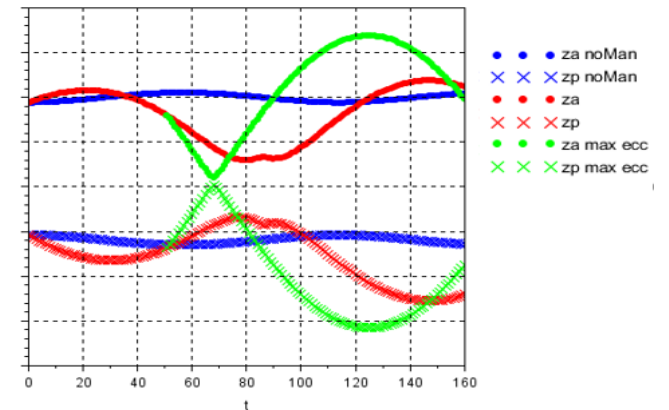
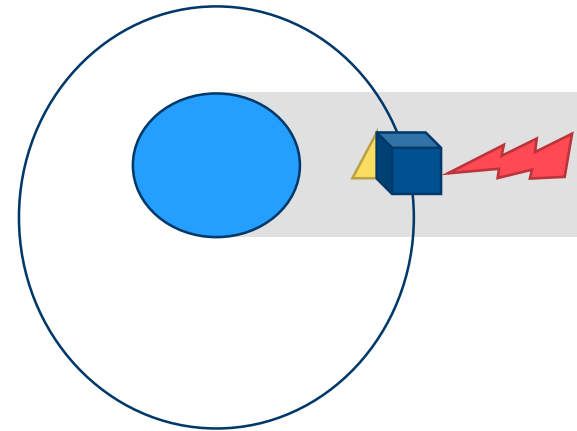
❖ W11, E12 and E24: altitude lowering

- **Large maneuvers** : up to around 5 m/s
- 2 impulses with 1.5 orbit separation
- Tangential axis



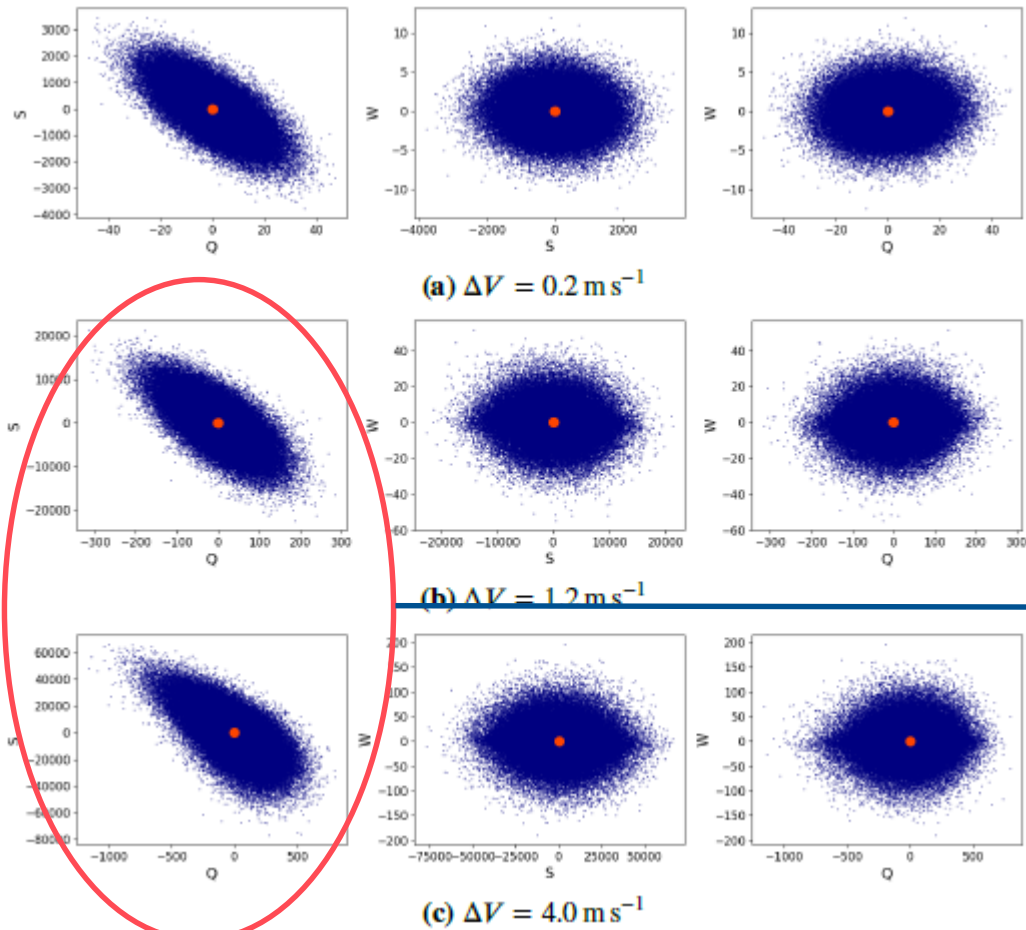
❖ W23: fluidic passivation

- small maneuvers : less than 0.02 m/s
- 1 impulse at every orbit
- Radial axis

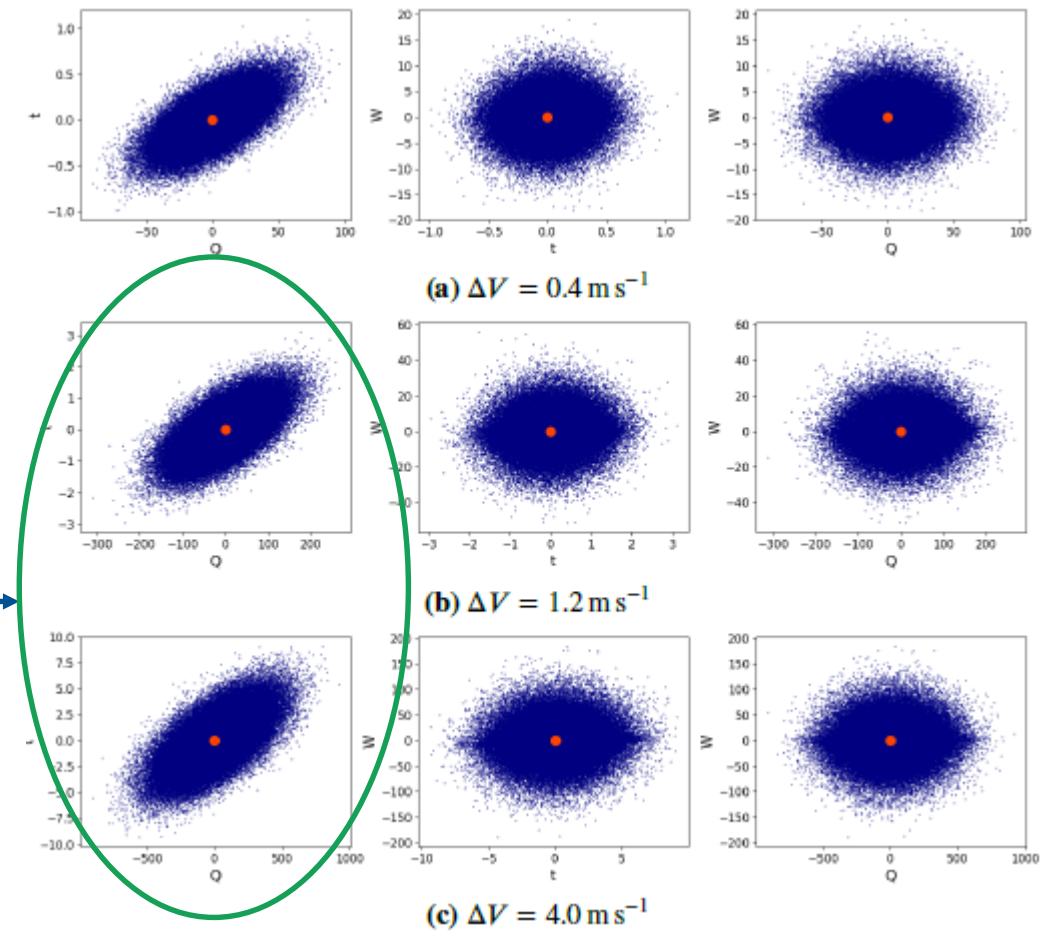


Large maneuvers

E12 results with QSW (24h)

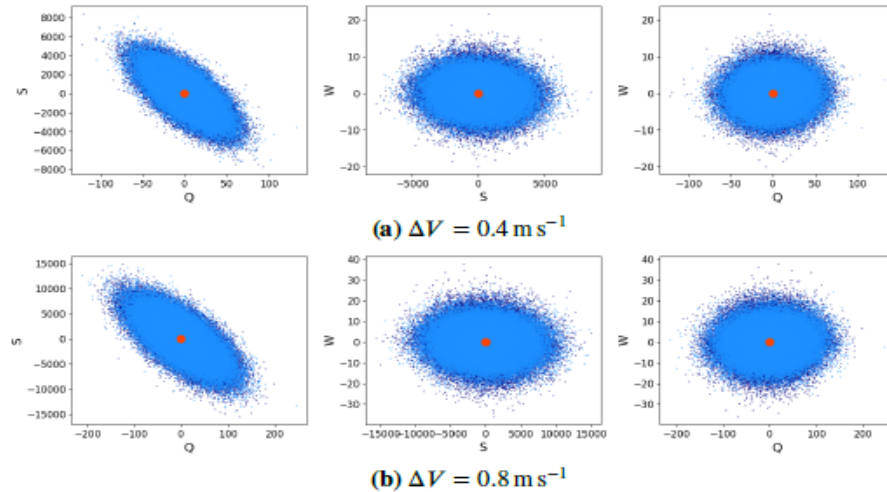


E12 results with QtW (24h)



Large maneuvers

E12 results with QSW (24h)



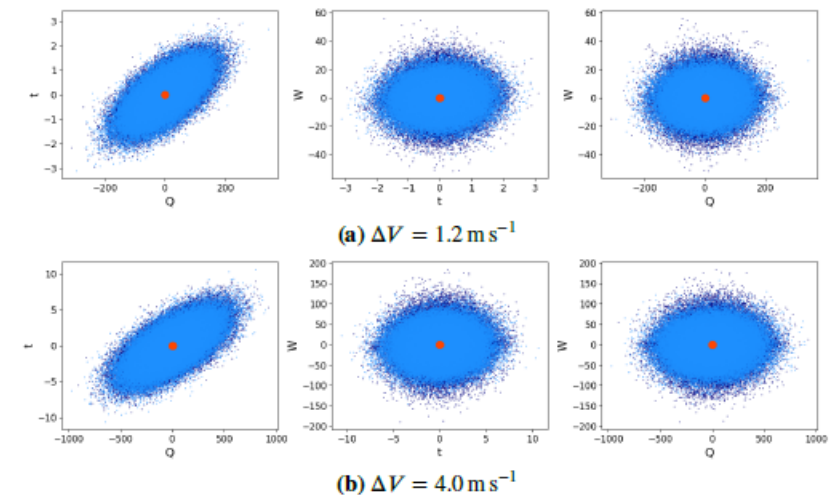
$$\Delta V_{\text{threshold}} = 1.2 \text{ m/s}$$

Gaussianity loss at 0.4m/s but due to W component

➔ Tangential loss of gaussianity at 1.2 m/s

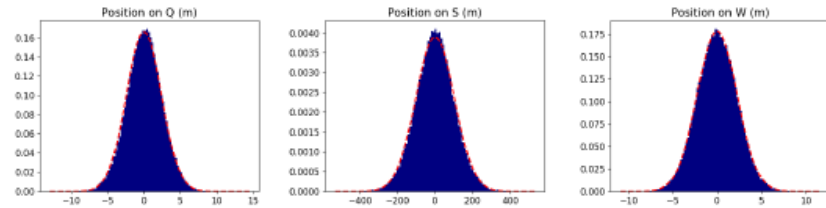
E12 results with QtW (24h)

Switch to QtW method for $\Delta V > 1.2 \text{ m/s}$

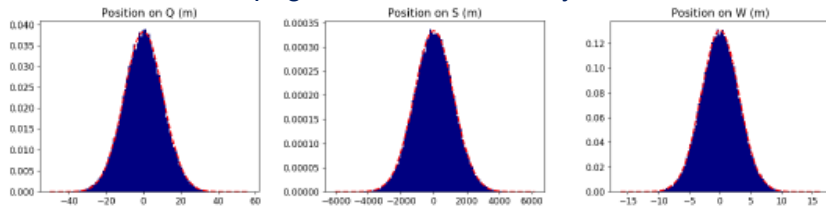


Small maneuvers

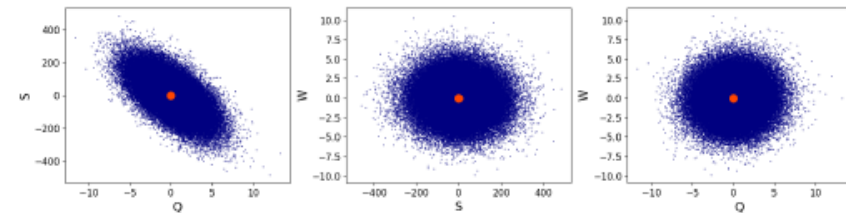
W23 results with QSW



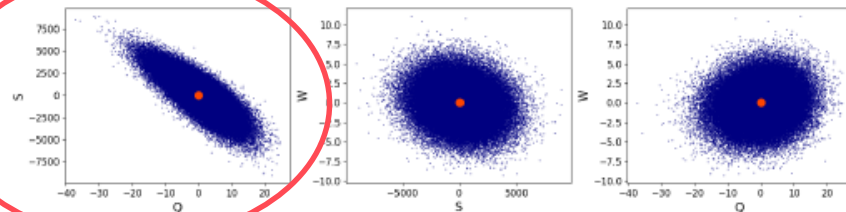
Propagation duration : 1 day



Propagation duration : 3 days



Propagation duration : 1 day



Propagation duration : 4 days

- ❖ **Gaussianity loss after 3 days only**
 - Due to radial axis (no secular effect)
- ❖ **Compatible of operational delays**
 - No need for QtW method

HOWEVER

Large number of maneuvers with significant dispersions



Shift in position needed

Conclusion

❖ W11, E12, E24: **Small** number of **large** tangential maneuvers

- Need for QtW method
- $\Delta V_{threshold} = 1.2 \text{ m/s}$

❖ W23 : **Large** number of **Small** radial maneuvers

- Standard method in QSW **OK**
- **BUT** Need for the shift in position

THANK YOU FOR YOUR ATTENTION

Questions ?