



# JUNK BUSTERS

## NASA SPACE APPS CHALLENGE 2015

### FRANKFURT

Eduardo Cruz, Tim Elberfeld, Marcel Kaufmann, Sebastian Schleemilch, Philipp Schneider

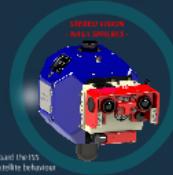


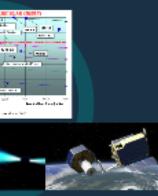
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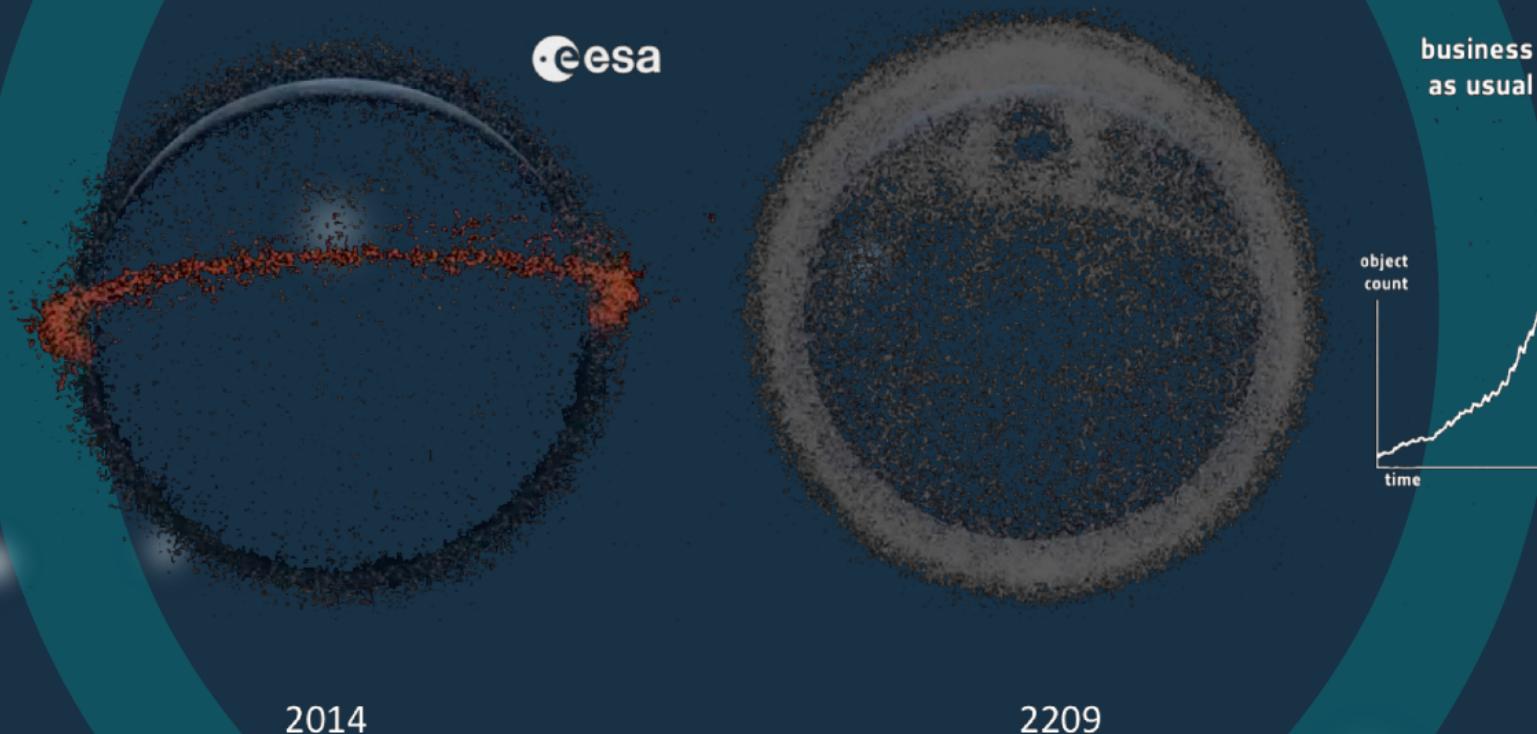
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# **SPACE JUNK:** *Human made problem*



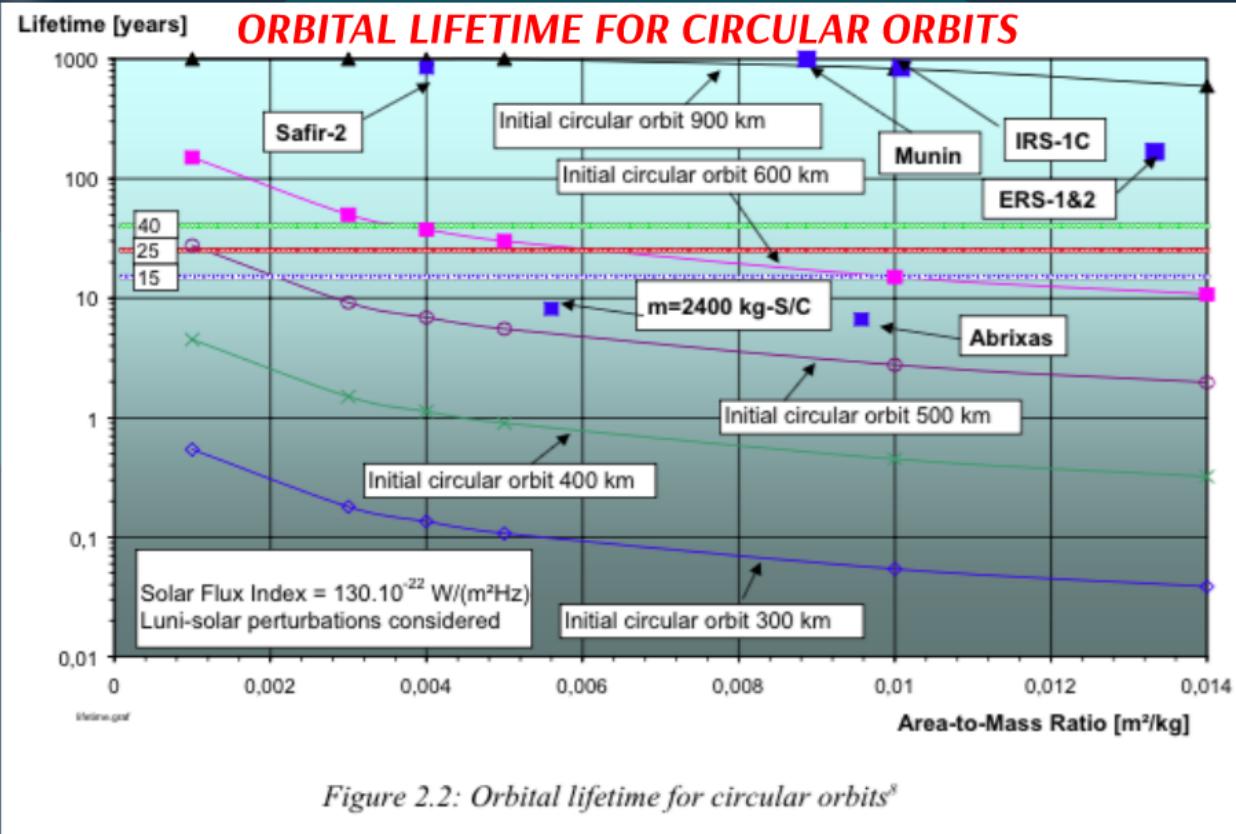
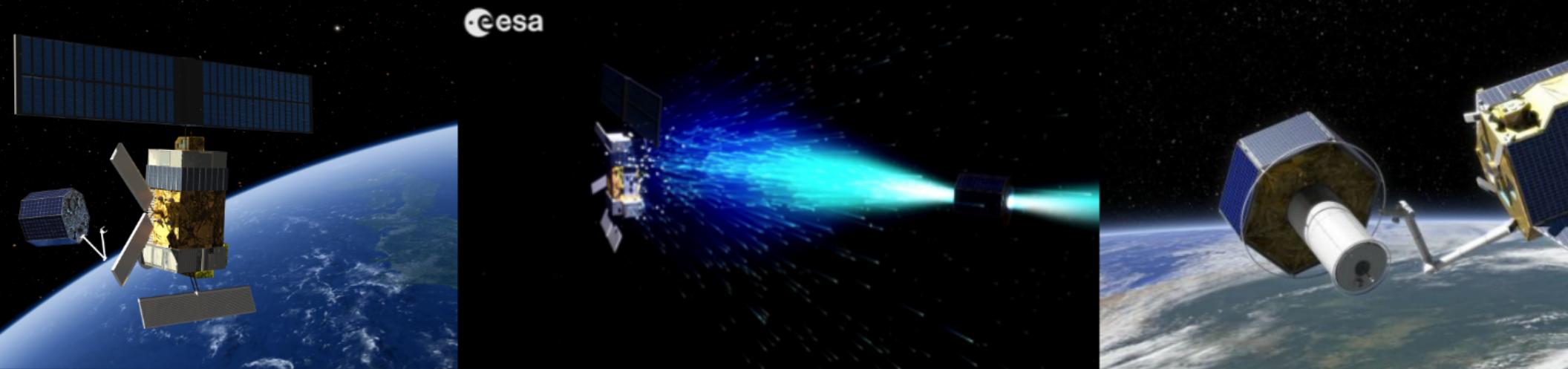


Figure 2.2: Orbital lifetime for circular orbits<sup>8</sup>

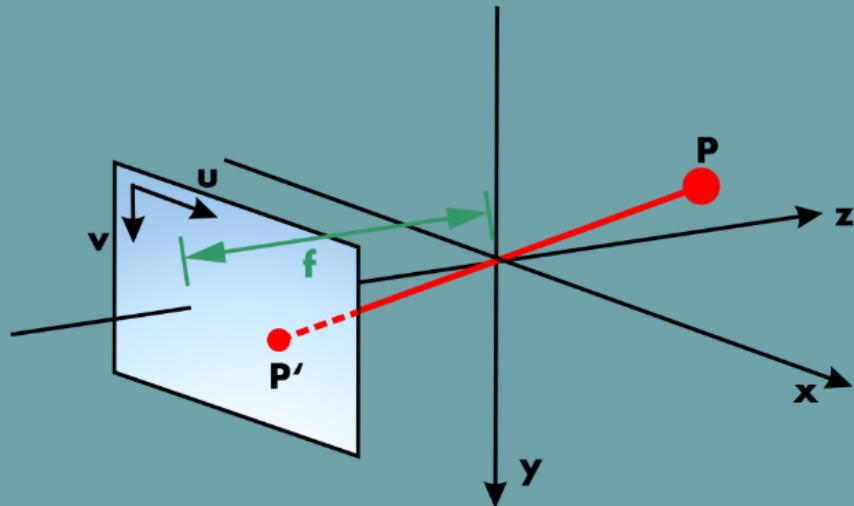


## **STEREO VISION - NASA SPHERES -**



on board the ISS  
monitors satellite behaviour

# *pin hole camera model*

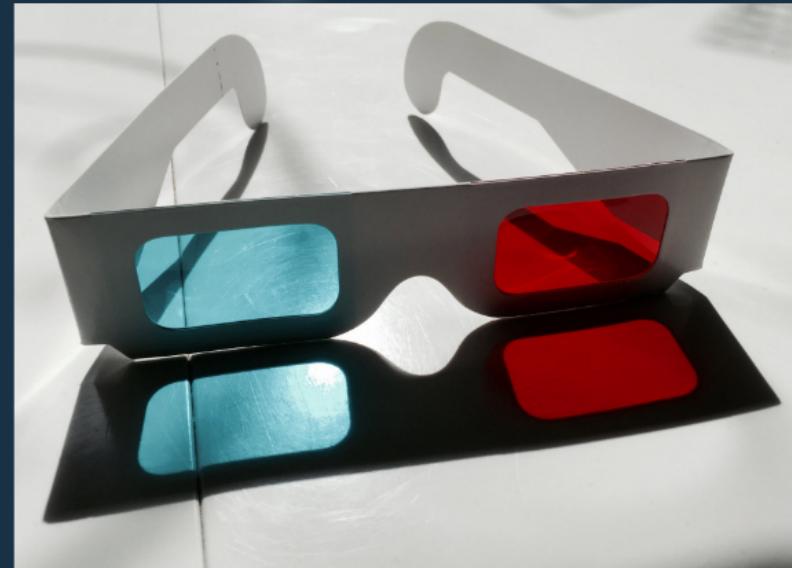


*our stereo sensor*



# **DEMO**

JUNK BUSTERS  
ensure future space exploration by using stereo data  
guide to space junk and remove it in save ways





# Ensuring the Future of Space Exploration

Collision Detection  
Operator / Junk

Object's Center of Mass  
and Speed Tracking

OPERATING JUNK BUSTER  
Rel Dist: 319,98 m  
Rel Speed: -212,1 m/s  
Impact: Infinity s

204 m

JUNK  
Rel Dist: 293,77 m  
Rel Speed: 121,07 m/s  
Impact: 2,4 s

Impact Detection  
with Controller

CONTROLLING SPACE BUSTER VIEW

## ***VISION and FUTURE DEVELOPMENT***

- Improved collision avoidance with respect to navigation
- Collaboration between multiple JUNK BUSTERS and/or humans in space
- Evaluate other 3D sensors



*„The dinosaurs became  
extinct because they didn’t  
have a space program.“*

*- Larry Niven*



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