

# DMF as Support Framework for Impact Risk Applications

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2021-03-04





Since 2020, internationally endorsed design requirements include:

- An assessment shall be made of the risk that a space debris or meteoroid impact will cause a break-up before its end of life.
- An assessment shall be made of the risk that a space debris or meteoroid impact will prevent the successful disposal.



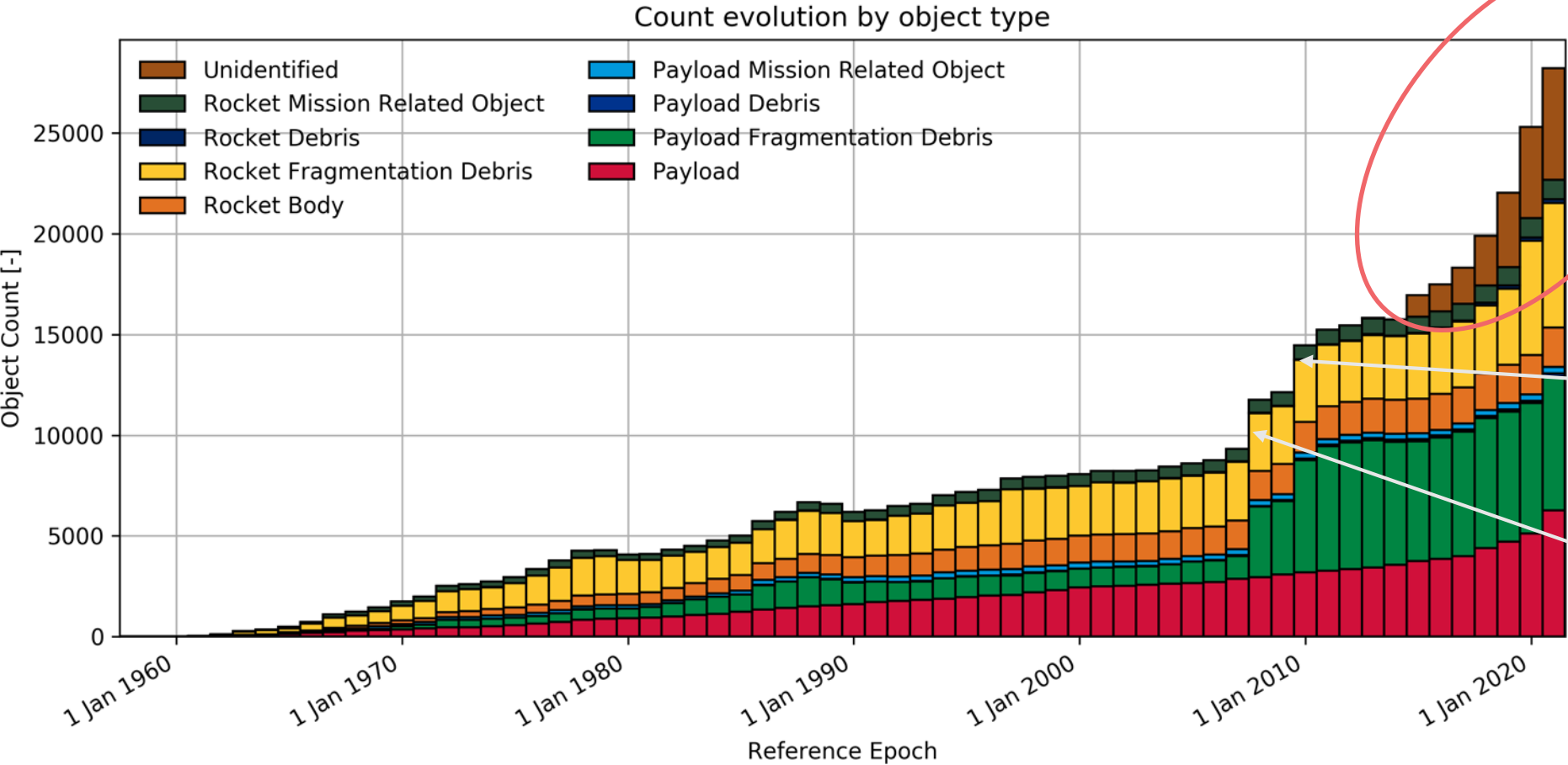
## Part of the DMF objectives:

1. **Creating a tight integration of scientific applications for of space debris mitigation related products**
2. Move towards digital engineering
3. Enable an open source community approach
4. **Maximum compatibility with ISO 24113 and ESSB requirements**
5. **Improve and Innovate**

## For Impact Risk Applications:

1. Provide the required interfaces to the MASTER model for expert tools
4. Provide a demonstration of the intended verifications envisaged
5. **Provide an up-to-date baseline for the future population**

# “Prediction is very difficult, especially if it is about the future” (N. Bohr)



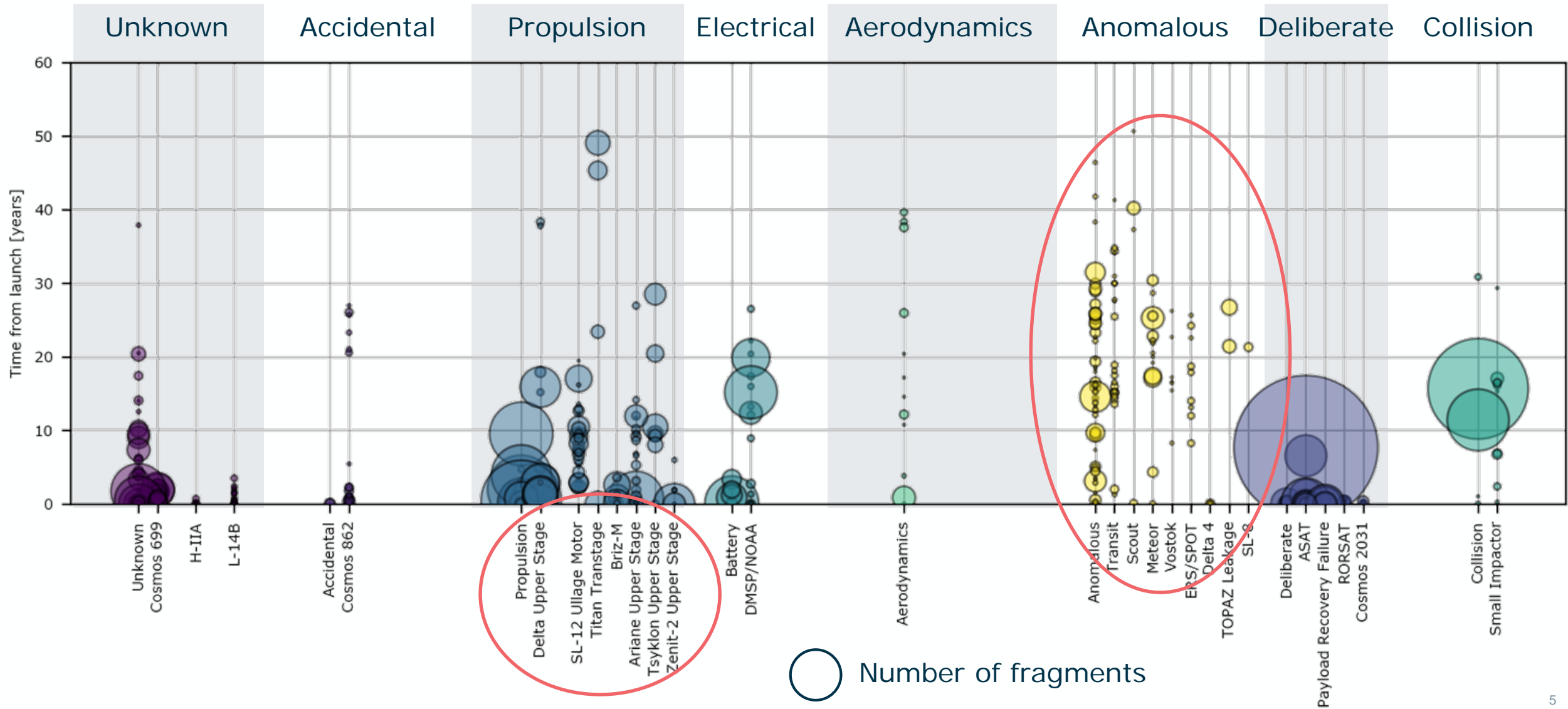
2015-...  
Improved surveillance  
requires model re-  
calibration

10/02/2009  
Cosmos-Iridium  
collision  
3294 new objects

11/01/2007  
Chinese anti-satellite  
test  
3439 new objects



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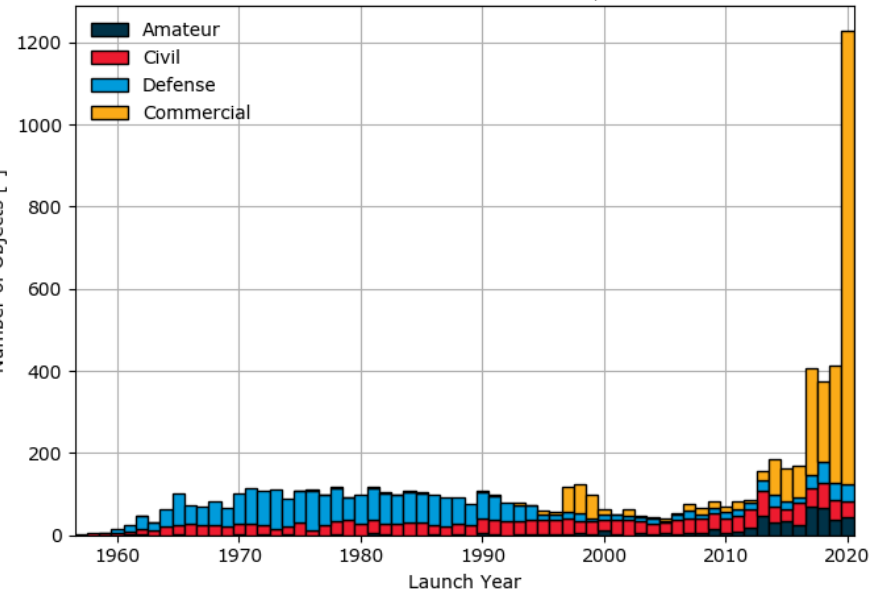
○ Number of fragments



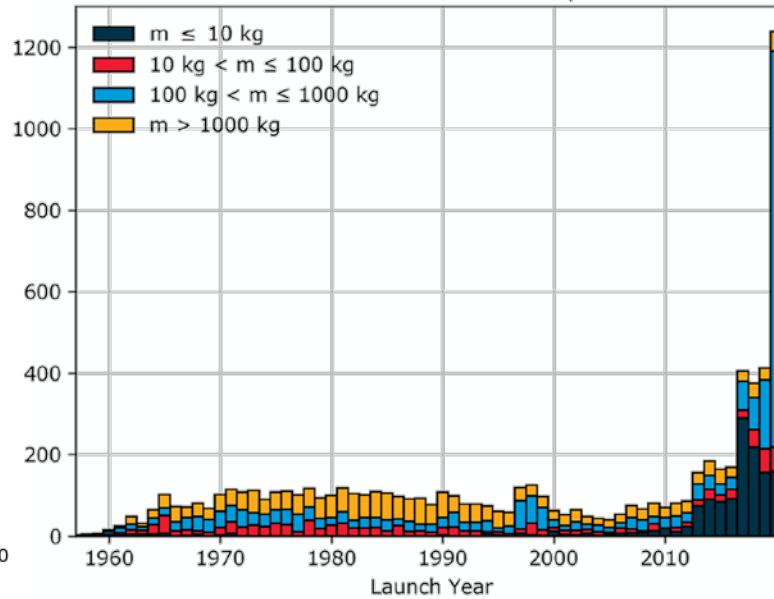
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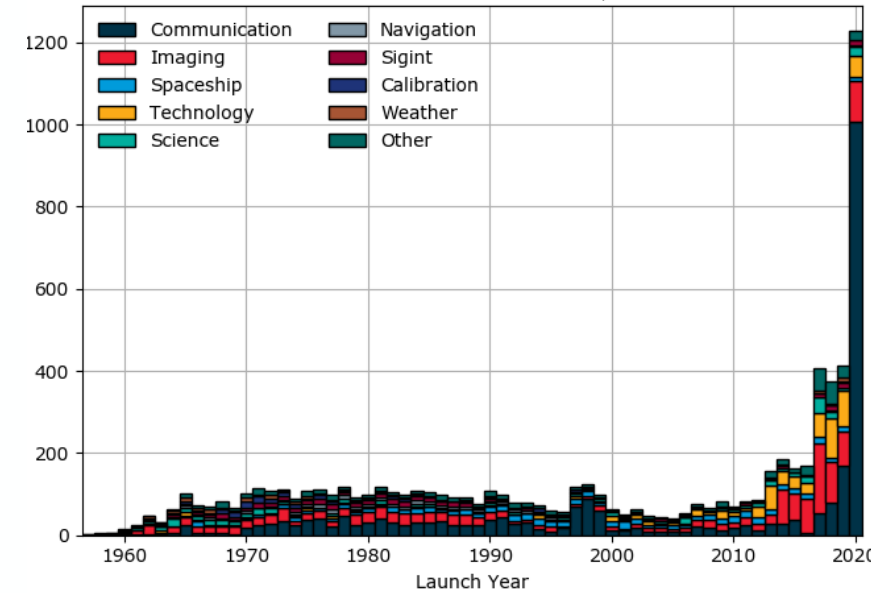
Payload Launch Traffic into  $200 \leq h_p \leq 1750\text{km}$



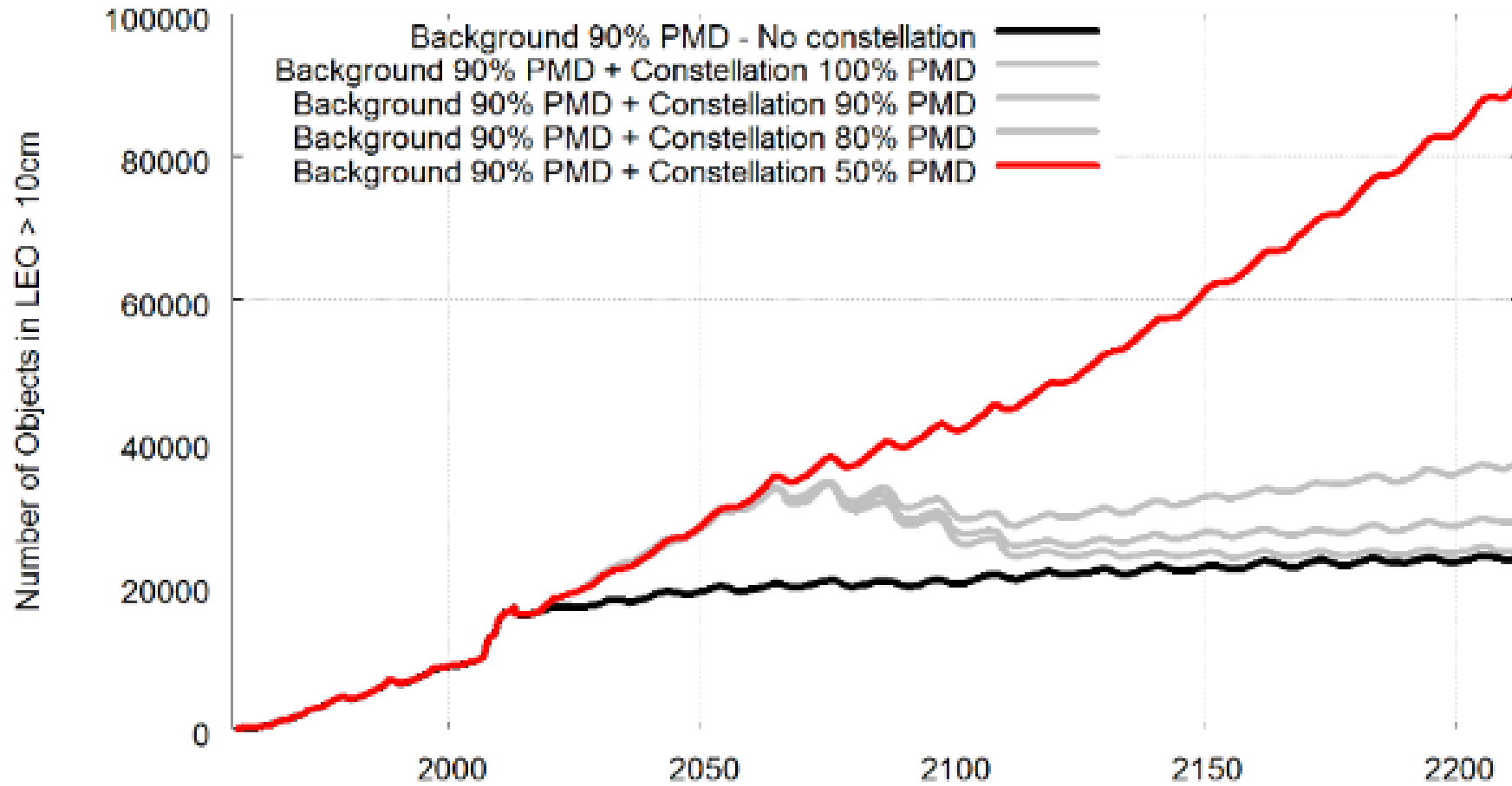
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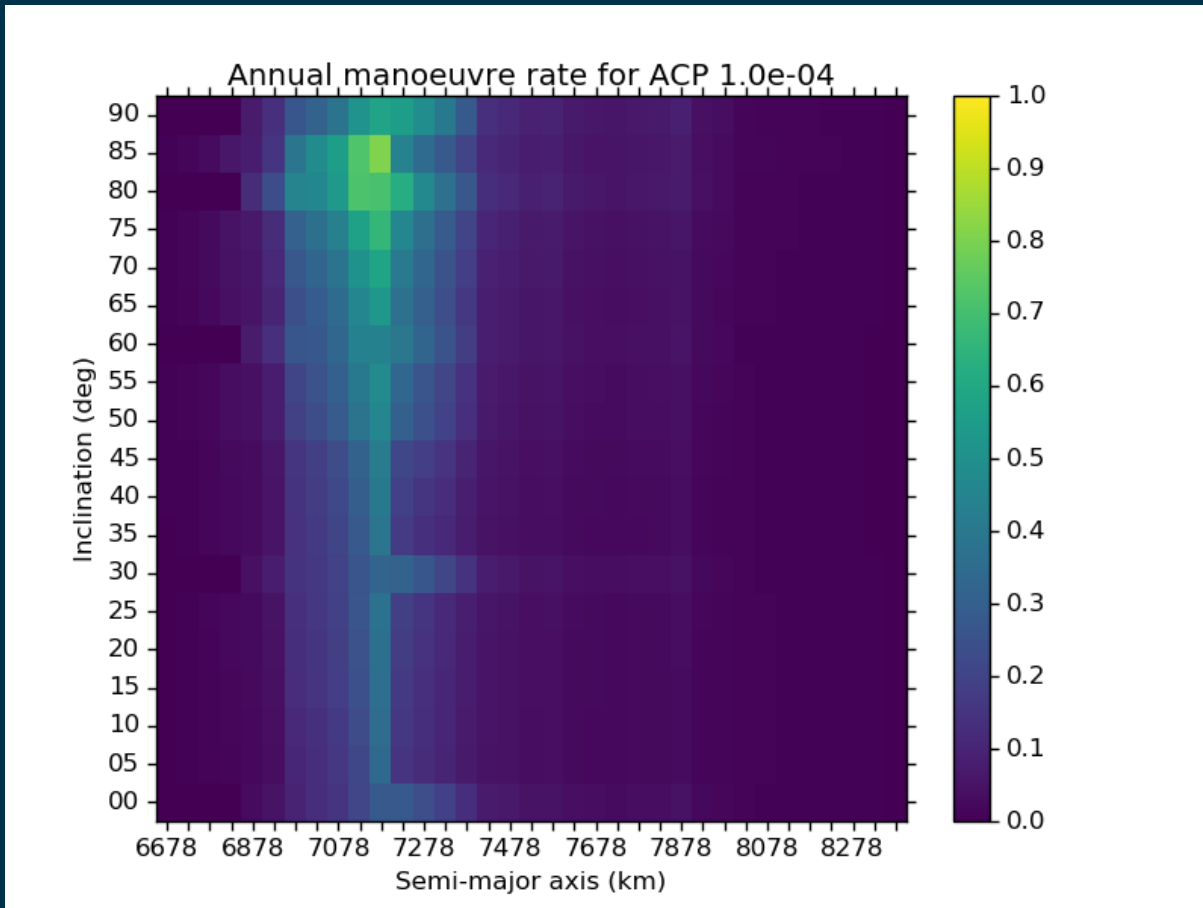


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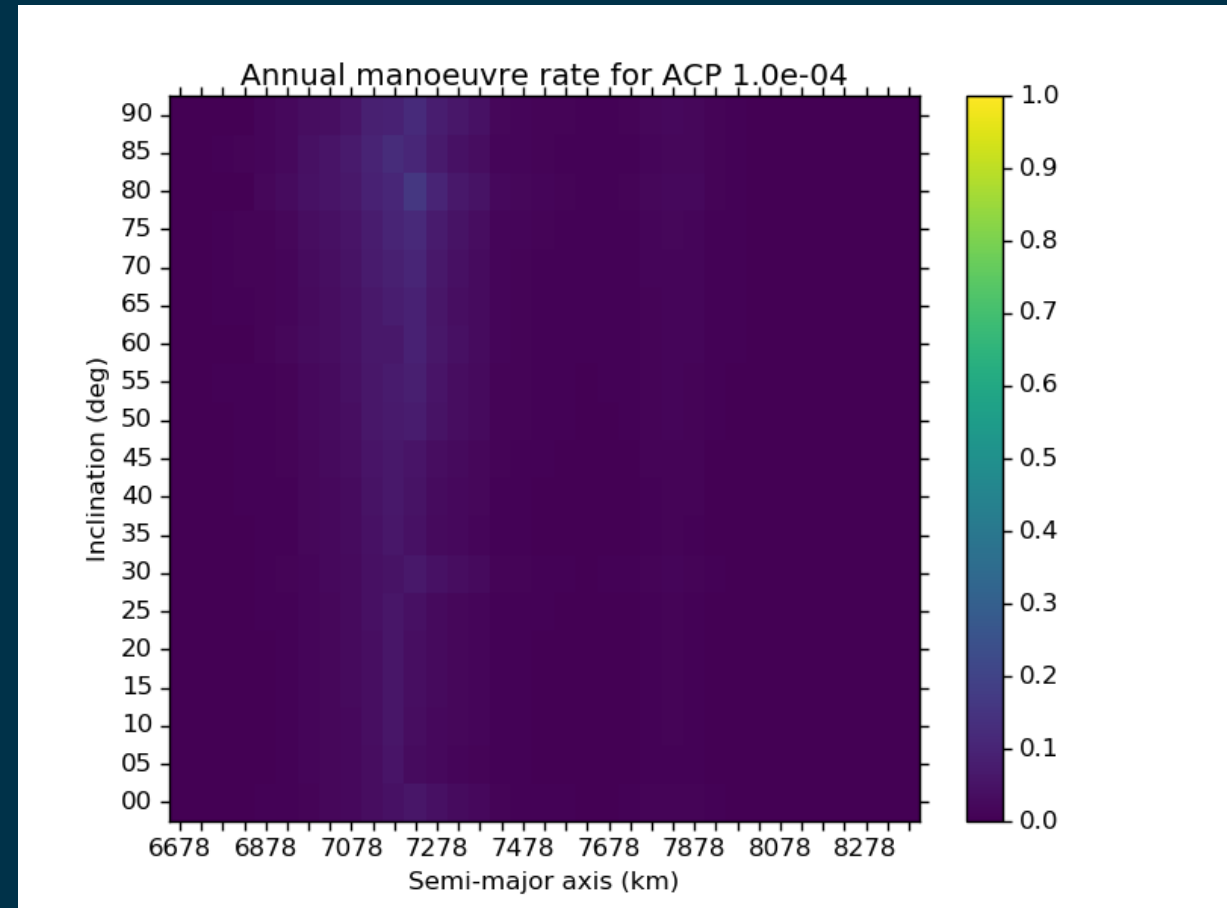


# The design consequences are however real

## Pessimistic view of 2073



## Optimistic view of 2073



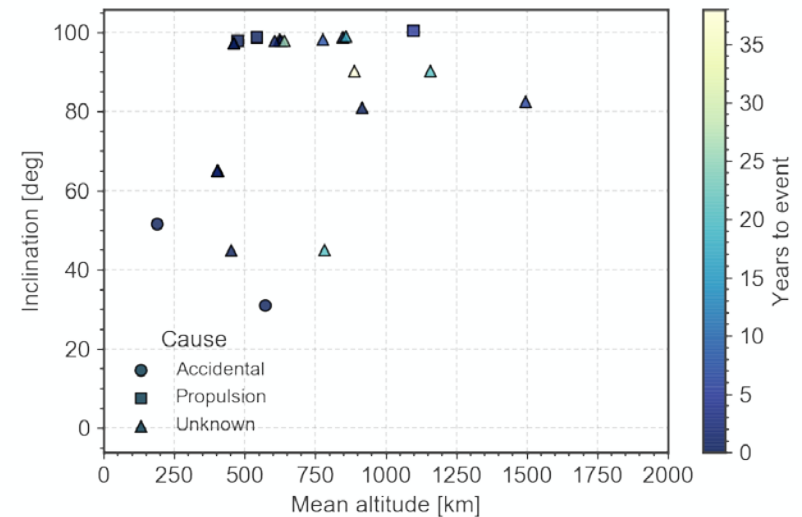
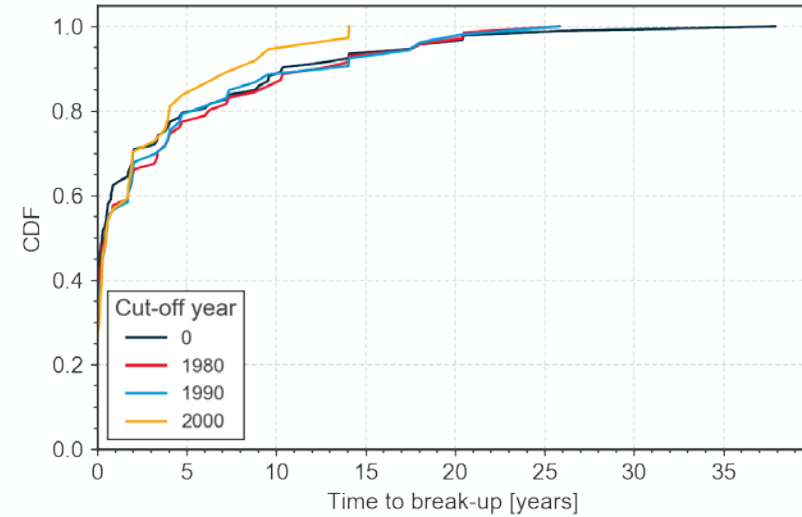


Use DISCOS to yearly estimate:

- Classes: Constellations and background environment
- Space Debris Mitigation Compliance rate per class
- Definition of the average spacecraft over an epoch and orbital zone
- Launch traffic defined by epochs

Discussion on the baseline? Standardise the baseline?

Automated environment prediction (DELTA4),  
but not Automated MASTER recalibrations.



# Thank you

