

SpOC - Mine the Belt

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The Idea(s)

- Inspired by GTOC XI Challenge's setup
- Asteroids are a great source of resources
- Asteroids may have different compositions
- Amount of available compute should not decide the winner
- Let's make it more interesting than "just" clear single objective
- Compositions and orbits can be correlated
- Compositions can be differently rare
- Let's add propellant as a constraint

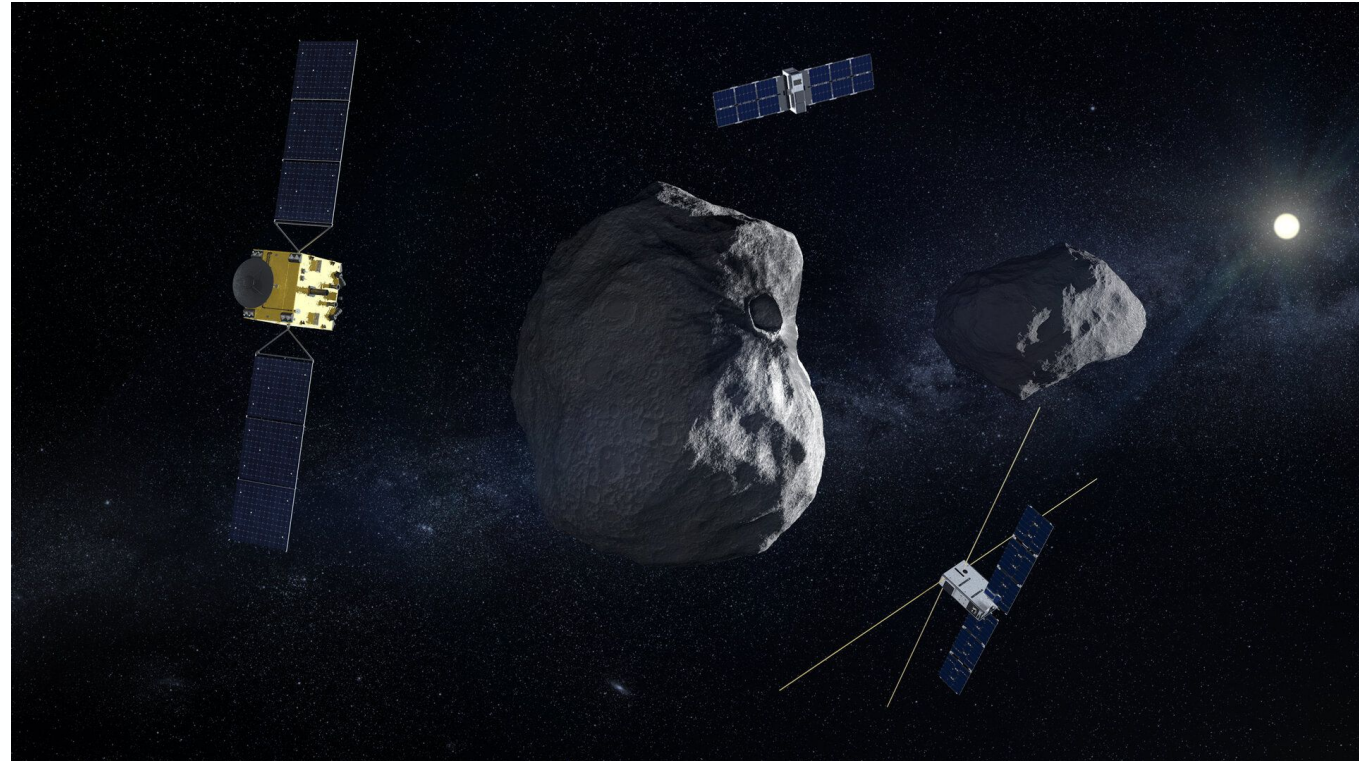
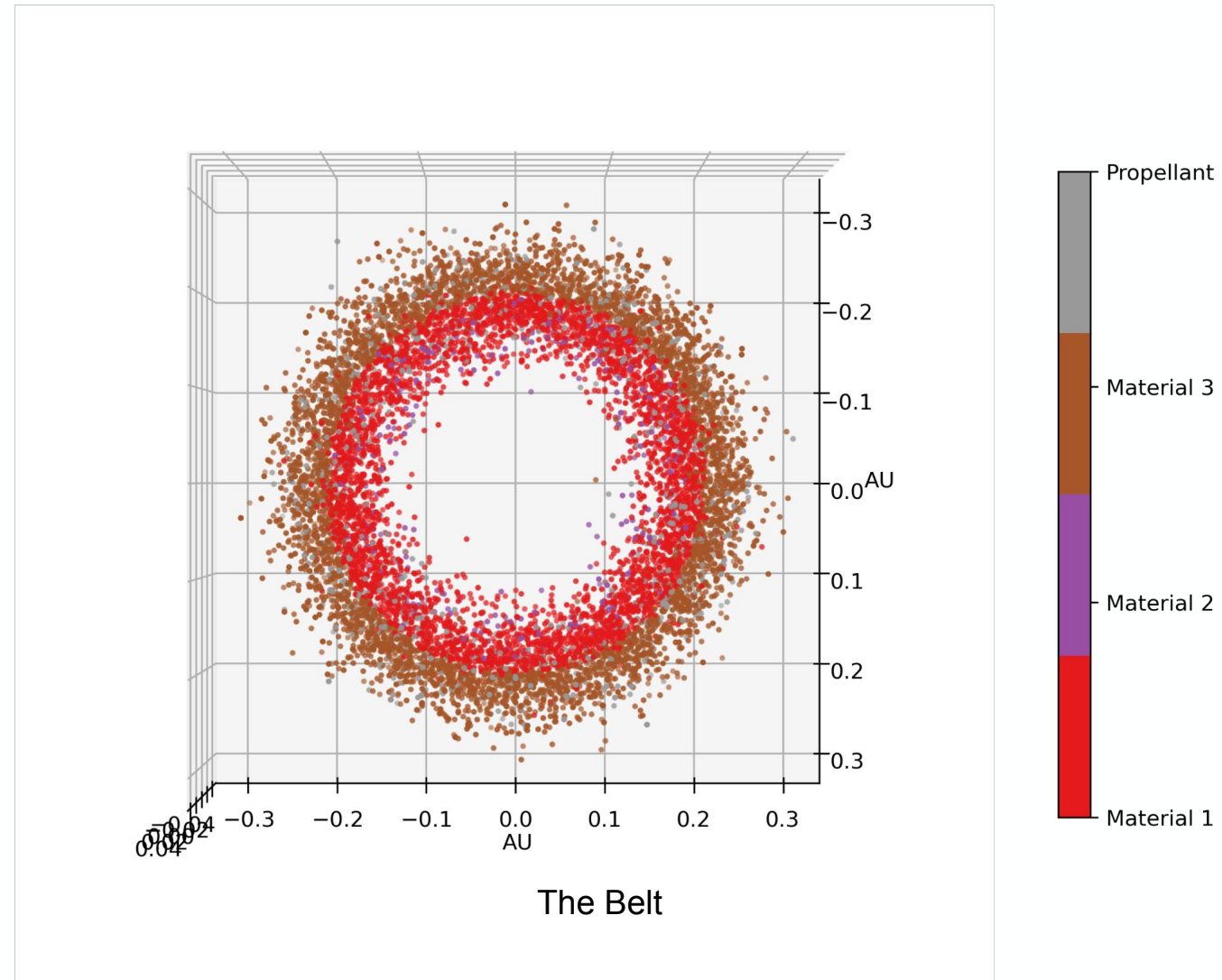


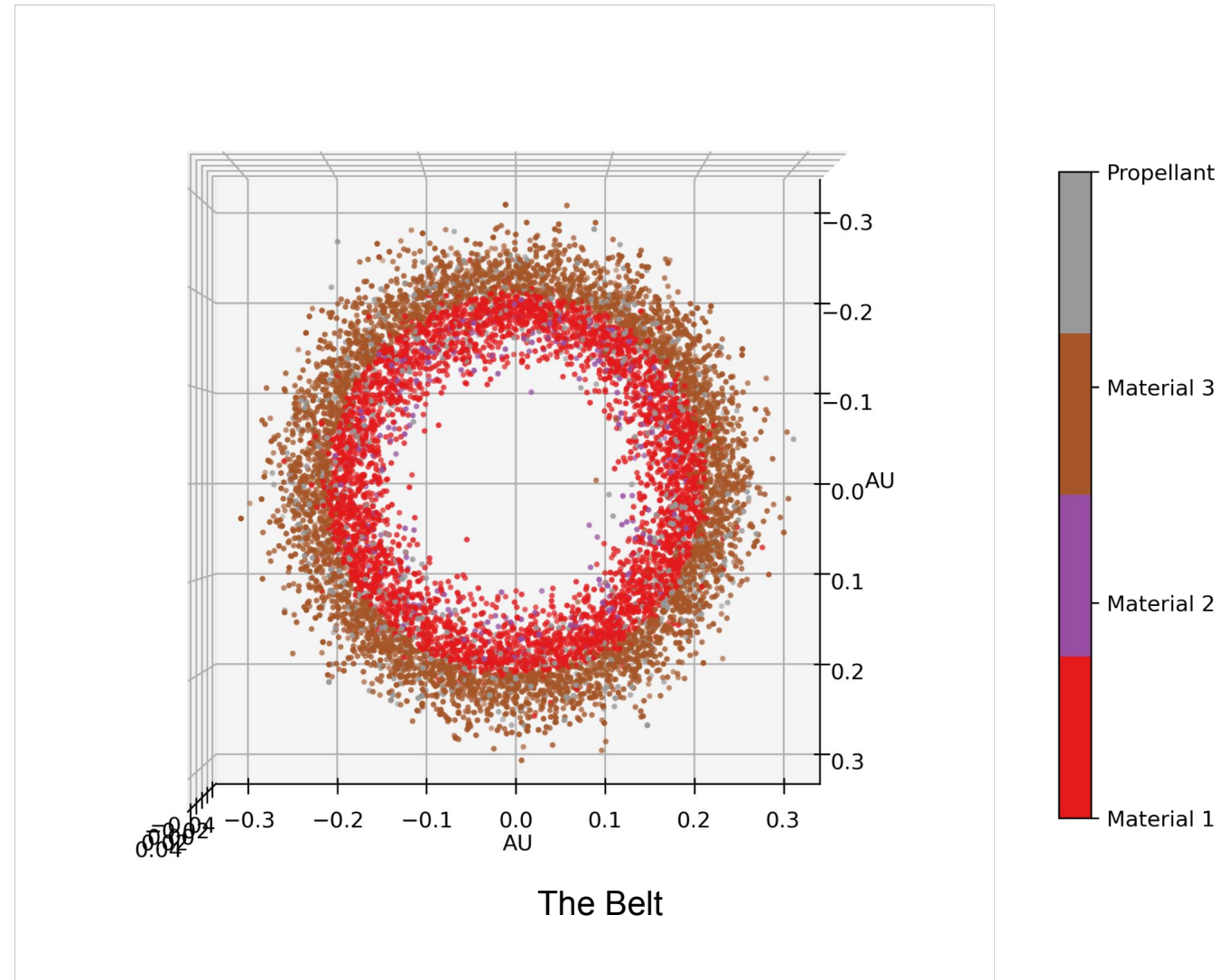
Illustration of the Hera mission - esa.int

The Setup

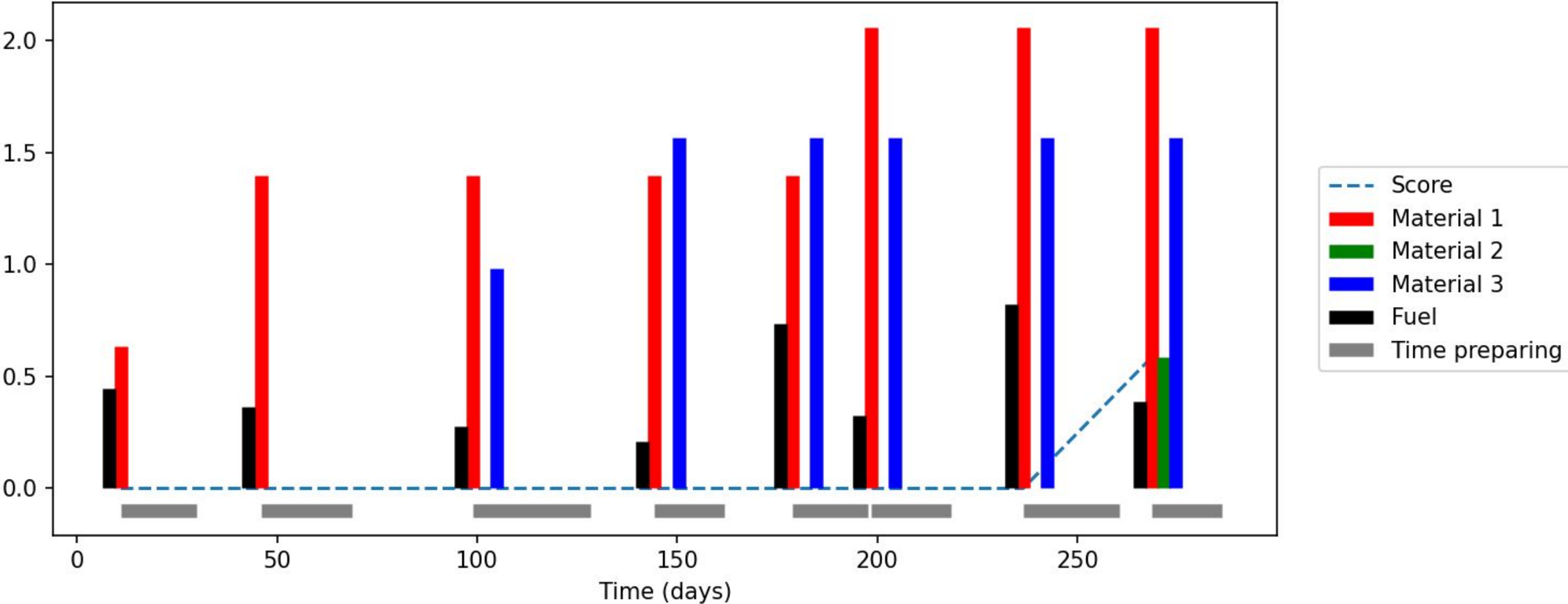
- 10 000 asteroids
 - Materials 1-3: 4192, 306, 4504 asteroids
 - Propellant: 998 asteroids
 - Different mean semi-major axis depending on material
 - Uniformly random, mild eccentricity and inclination



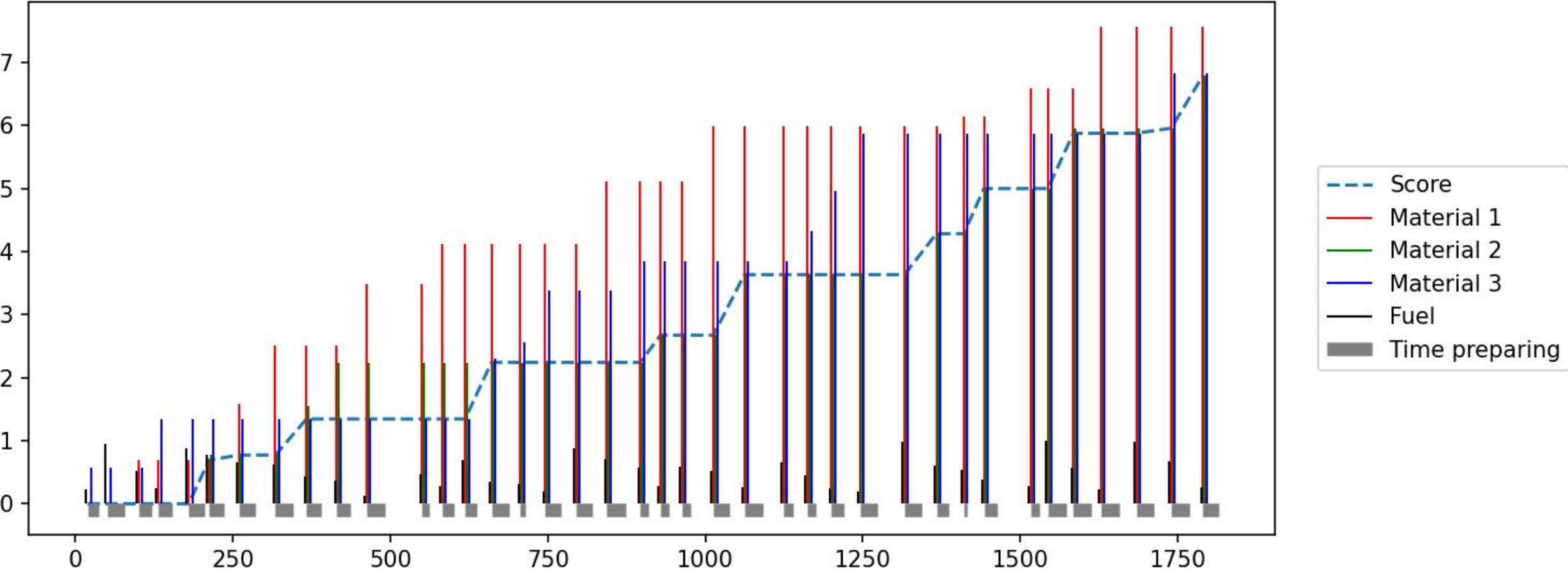
- 10 000 asteroids
 - Materials 1-3: 4192, 306, 4504 asteroids
 - Propellant: 998 asteroids
 - Different mean semi-major axis depending on material
 - Uniformly random, mild eccentricity and inclination
- Parameters
 - Material / Propellant
 - Mass
 - Orbit
 - Time of flight for visits (5 years)
 - Storable deltaV, time to prepare asteroid



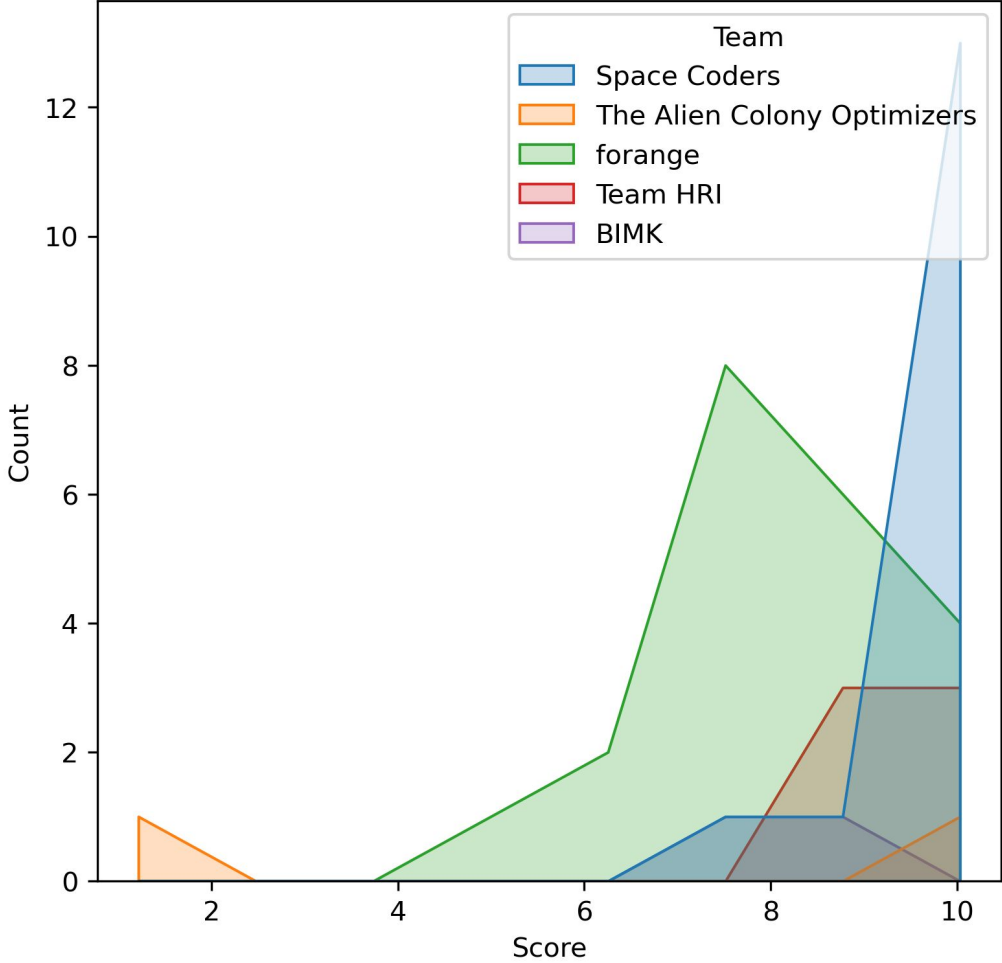
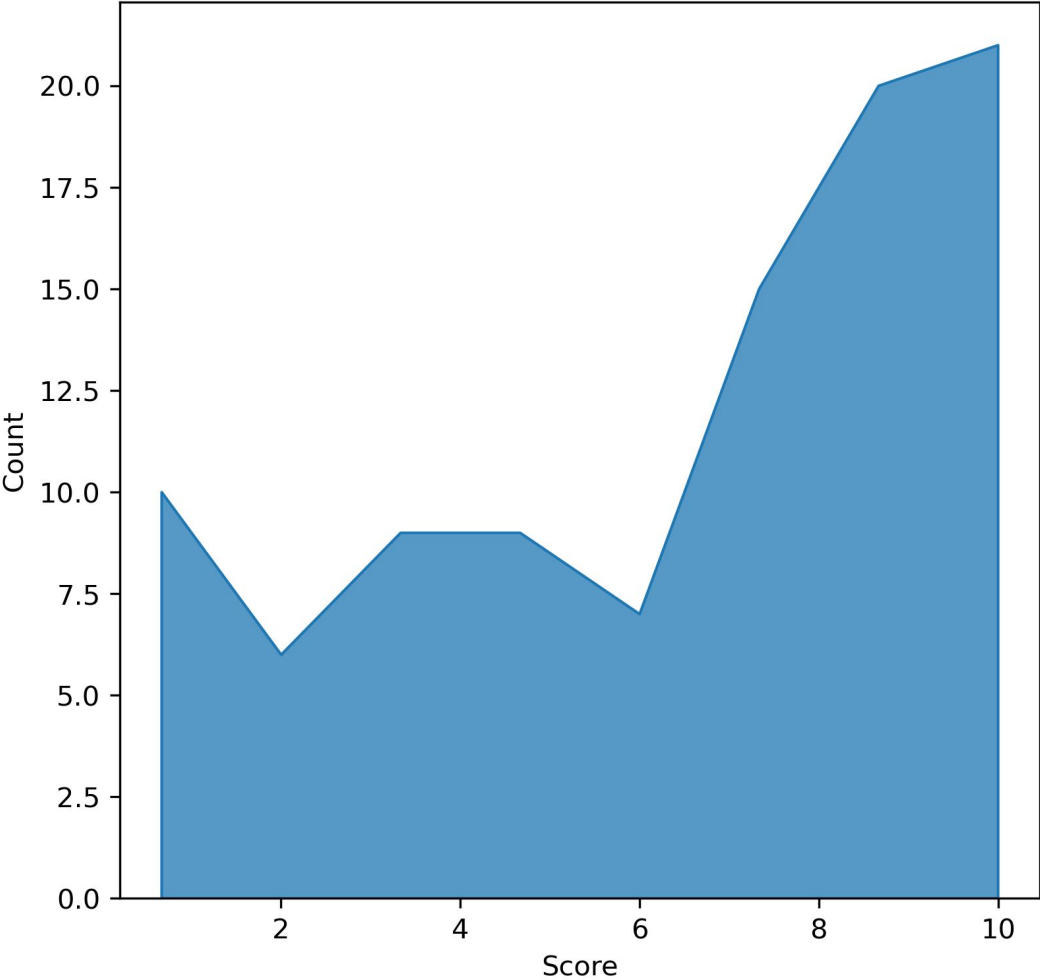
The Objective Function



The Objective Function



Competition Results



What's Next - Team Presentations

IIIA-CSIC, 2nd with score of 10.103

Albert López i Serrano, Christian Blum (IIIA-CSIC) , Guillem Rodríguez i Corominas (IIIA-CSIC) , Mehmet Anil Akbay (IIIA-CSIC) , Roberto Maria Rosati (University of Udine)

Honda Research Institute Europe, 4th with score of 9.713

Felix Lanfermann (Honda Research Institute Europe) Nils Einecke (Honda Research Institute Europe) Steffen Limmer (Honda Research Institute Europe)

CS Group - Space Coders, 1st with score of 10.663

Sébastien Goulet (CS Group) Vincent Debout (CS Group)



AI-generated illustration of the journey