FossaSat-1 Satellite Space Debris Mitigation Plan

Orbital Decay, Reentry & Tracking

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This document is intended to inform about the analysis of FossaSat-1 orbital decay and reentry simulations as well as the expected radar trackability.

The DRAMA software, available from the European Space Agency at: https://sdup.esoc.esa.int/web/csdtf/home will be used to simulate the following scenarios.

Orbital Decay

Input Data – Target orbit :

6763.100 - semi-major axis [km]

0.000100 - eccentricity [-]

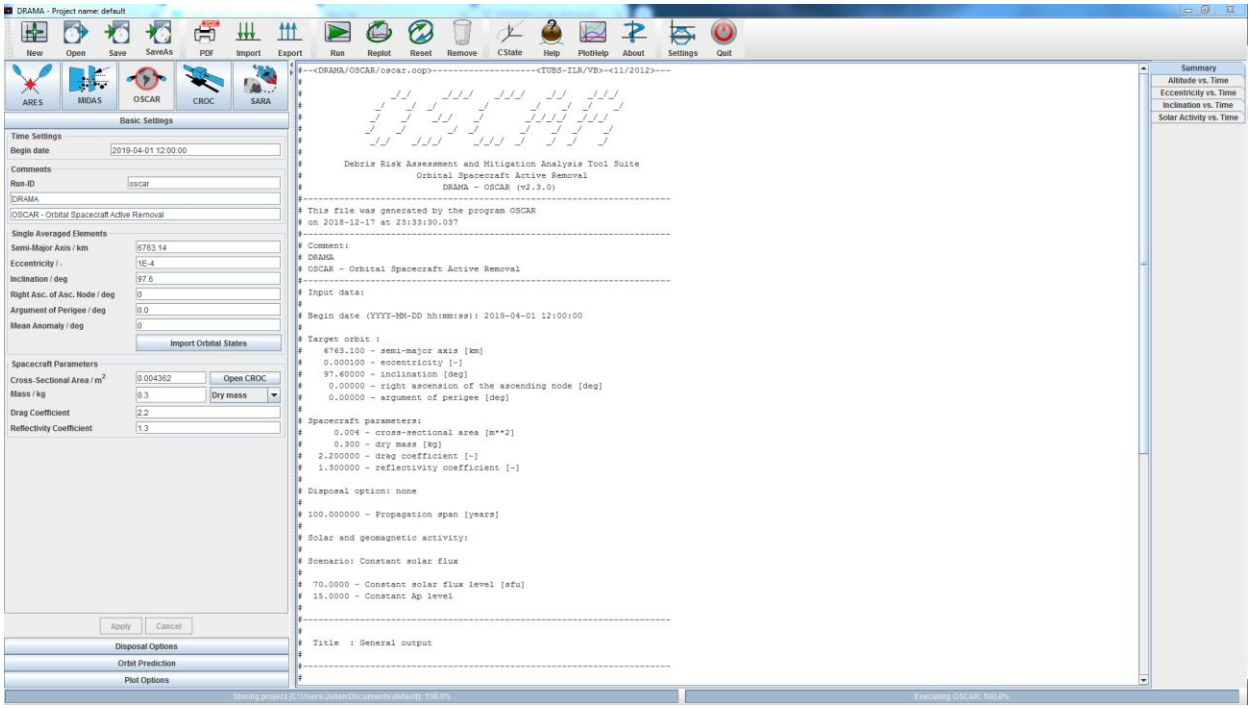
97.60000 - inclination [deg]

Spacecraft parameters:

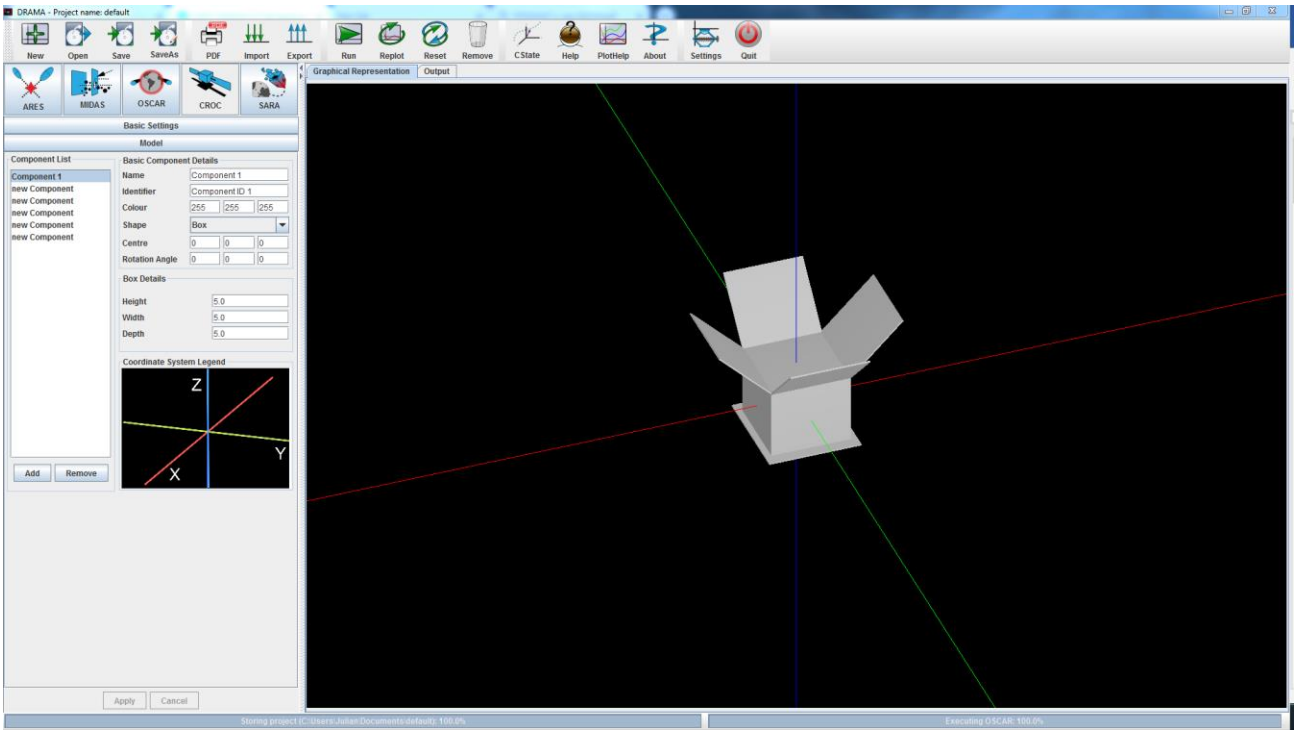
0.004 - cross-sectional area [m**2]

0.300 - dry mass [kg]

2.200000 – drag coefficient [-]



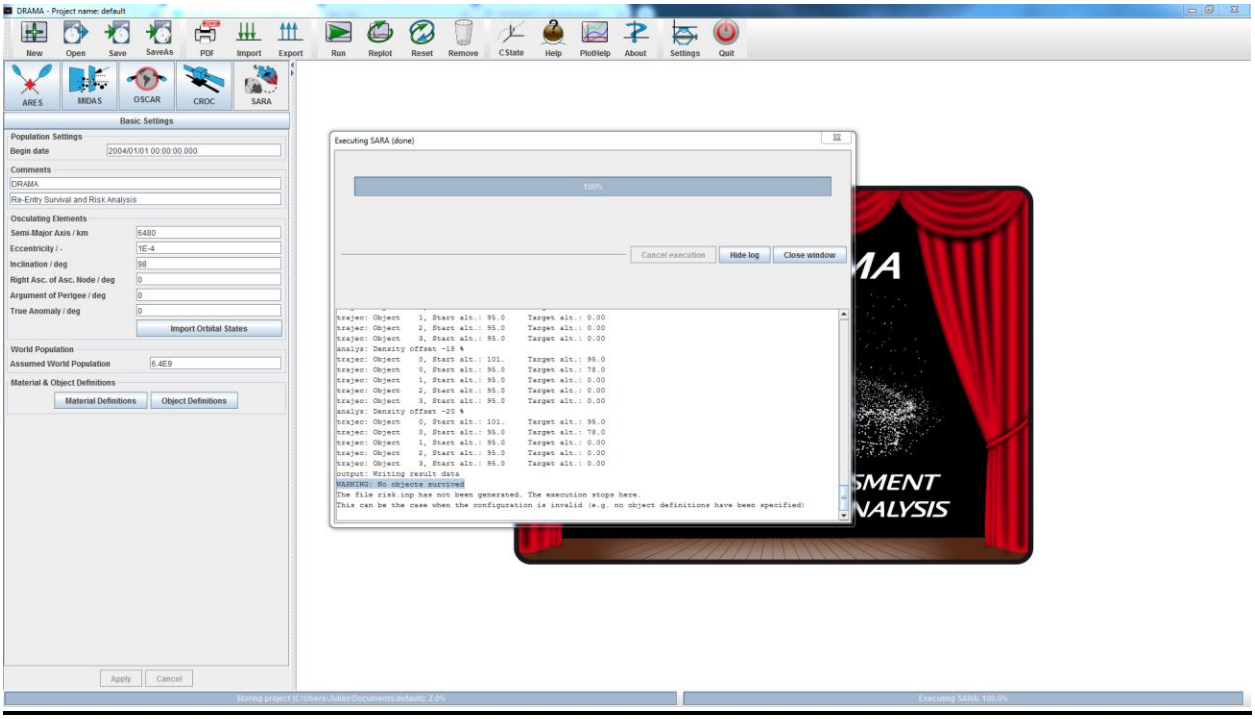
Model – Calculated a cross sectional area of 0.004 M^2



Results

Estimated orbit using worst case scenario data indicates an orbital lifetime of 0.96 years (incl. margin of 5.00 % according to ISO27852:2011). The satellite is thus compliant with the maximum 25-year natural orbit lifetime regulation, the shortest possible orbital lifetime is 0.44 years if we account for worst case scenario drag and lower mass.

Re-Entry



Re-entry calculation determined that no objects would survive, this result has a substantial margin taking in consideration a satellite various orders in magnitude larger than FossaSat-1 would still not survive re-entry.

Tracking

Pocketqubes have successfully been tracked in space at sizes smaller than FossaSat-1, the following graph taken from the TU Delft "Long-term performance analysis of NORAD Two-Line Elements for Cubesats and Pocketqubes" within the study shows that satellites with a cross-section smaller than FossaSat-1 have been successfully tracked by NORAD. Furthermore, thanks to the deployable solar cells, the satellite has a reflective cross-sectional area approximately equivalent to that of a 1U CubeSat Satellite, facilitating its tracking.