DRAMA Clinics 2025e2
Collision avoidance & population modelling (ARES & MASTER)

Space Debris Office

13/06/2025

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ARES and debris sizes

“What is the difference when using DRAMA, to determine the manoeuvre rate etc, between the manually determining the size and inputting it as the minimum particle size in ARES and selecting the EMR option in the simulator? (the Energy-to-Mass ratio option in ARES as per ESSB-HB-002 Annex C)”

- The EMR criterion (computed from the debris size assuming Aluminium spheres) generally provides a slightly lower ACP than using the minimum size.
- ARES calls the MASTER model and get the flux spectrum in the requested size regime.
- That spectrum also comes with full directionality information, i.e. it checks the impact energy for each flux contribution and aggregates on the share of the spectrum that surpasses the user defined EMR criterion.

ARES / MASTER population issues (1/2)

Recently, we have installed the new MASTER and DRAMA versions to perform the computation, and we have faced the following issues:

- The ARES tool cannot begin the computations due to a hash check error in the master.ekf file → Do you know what might be causing it?

→ A new master version has been embedded to facilitate population updates independenlty of DRAMA updates. This might be an inconsistency in the version used.

- When using the old population (MASTER-8 Condensed Population Files (version 1911)), the DV and maneuver rate results for the next years are significantly different than the ones computed in previous years. → We would like to know if there has been a change in the computation of these parameters in the latest DRAMA version.

→ Requires further Information

ARES / MASTER population issues (2/2)

Recently, we have installed the new MASTER and DRAMA versions to perform the computation, and we have faced the following issues:

- We have detected minor variations between successive ARES executions → We would be interested in knowing how this DV is computed to understand the reason.

→ Requires further information. In general, there is a random draw to assesses the likelyhood that an encouter requires a maneuvres, any difference between runs should be numerical noise in nature.

- Additionally, we would like to know whether the generation of a predicted future population is foreseen.

→ A yearly reference population update (needed for ESSB-ST-U-007) will be generated as outcome of the yearly Space Debris Environement report.

→ A future population will follow the reference population reléase with a few months delay

ARES 90% reduction.

“There is a question I have related to ARES and a debris mitigation requirement. Requirement 5.3.3.3b that relates the debris density and acceptable ACPL.

I have found to be complicated to estimate the 90% reduction for certain altitudes as it appears that there is no workable ACPL that would be compliant at certain altitudes. The spacecraft at XYZ km with ACPL of 10-4 has >90% reduction, however at ABC km < 60% for any ACPL that DRAMA would work with.”

- ➔ Requires more detailed information, but for 2024 MASTER reference population there can be a high dependability on orbits that align with constellations.
- ➔ Space Debris only population model under generation; Software switch for debris/manouvrable/active populations foreseen for MASTER 9 (2027).

Where to get help?

A first place of calling for the users, by the users:

https://debris-forum.sdo.esoc.esa.int/

Specific queries requiring detailed understanding of underlying tools or spacecraft design details:

space.debris.support@esa.int

ESA or ESA-related project support, contact with your Technical Officer:

Vitali.braun@ext.esa.int or Stijn.Lemmens@esa.int