Space Debris related Activities at ESA

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ESA/ESOC Space Debris Office
> 1m  
> 10cm  
> 1cm  
> 1mm
Sentinel-1A Impact 2016/08/23 – onboard camera
Business as usual

object count

time

2010
ESA Debris Mitigation Process

Inter-Agency Space Debris Coordination Committee

Space sustainability
Adoption Notice of ISO 24113: Space systems - Space debris mitigation requirements

ECSS-U-AS-10C
Space sustainability - Adoption Notice of ISO 24113 (10/02/2012)

 ESA Space Debris Mitigation Compliance Verification Guidelines

ESSB-HB-U-002
ESA Space Debris Mitigation Compliance Verification Guidelines (19/02/2015)
Collision Avoidance in ESA
Collision Avoidance

Example
The new DISCOS Web Frontend

Launch Number

Launch Path

Launches per Launcher with Country
ESA Space Debris Tools

THE FOLLOWING ESA SPACE DEBRIS TOOLS CAN BE REQUESTED:

MASTER

MASTER (Meteoroid and Space Debris Terrestrial Environment Reference) allows to assess the debris or meteoroid flux imparted on a spacecraft on an arbitrary earth orbit. MASTER also provides the necessary computational and data reference for DRAMA and needs to be installed before DRAMA is installed.

DRAMA

DRAMA (Debris Risk Assessment and Mitigation Analysis) is a comprehensive tool for the compliance analysis of a space mission with space debris mitigation standards. For a given space mission, DRAMA allows analysis of:
- Debris and meteoroid impact flux levels (at user-defined site regimes)
- Collision avoidance manoeuvre frequencies for a given spacecraft and a project-specific accepted risk level
- Re-orbit and de-orbit fuel requirements for a given initial orbit and disposal scenario
- Geometric cross-section computations
- Re-entry survival predictions for a given object of user-defined components
- The associated risk on ground for at the resulting impact ground swath

Please be aware that the installation of MASTER is a necessary pre-condition for the successful operation of the DRAMA suite. MASTER provides the necessary computational and data reference for DRAMA and needs to be installed before DRAMA is installed.

DISCOSWEB

DISCOS (Database and Information System Characterising Objects in Space) serves as a single-source reference for launch information, object registration details, launch vehicle descriptions, spacecraft information (e.g. size, mass, shape, mission objectives, owner), as well as orbital data histories for all trackable, unclassified objects which sum up to more than 40,000 objects. Today, DISCOS not only plays an essential role in the various daily activities at the ESA's Space Debris Office, and it is the basis for operational processes in collision avoidance, re-entry analyses, and for contingency support. DISCOS also provides input to numerous and very differently scoped engineering activities, within ESA and throughout academia and industry. DISCOS-based routine activities also comprise the maintenance of a Re-entry Events Database to...
Current Behaviour: Post Mission Disposal in LEO

Payload Clearance in Low Earth Orbit (excl. Naturally Compliant Payload)

Rocket Body Clearance in Low Earth Orbit (excl. Naturally Compliant Rocket Body)
www.esa.int/debris
Consumption of Space
Effect of Current Guidelines

Guidelines
e.Deorbit Mission Scenario

"To remove an ESA-owned debris from 800-1000 km (near polar region)"

- **JAN 2024**
  - COMISSIONING AT 300 km CIRCULAR ORBIT
  - LAUNCH VEGA-C
  - TRANSFER AND PHASING TO TARGET ORBIT

- **FEB 2024**
  - TARGET INSPECTION

- **MAR 2024**
  - RENDEZVOUS AND SYNCHRONISATION
  - TARGET CAPTURE
  - STABILISATION

- **APR 2024**
  - DISPOSAL
Conferences

Next Event: ESA NEO and DEBRIS DETECTION CONFERENCE
https://neo-sst-conference.sdo.esoc.esa.int/
Space Debris Courses

• Coming up next:
  • ESA/ECSL space debris regulation, standards and tools workshop
  • ESOC, Darmstadt Germany, March 19-21
  • Holger.krag@esa.int