Inter-Agency Space Debris Coordination Committee

Annual Report 2022

Holger Krag on behalf of the IADC

60th Session of the UNCOPUOS STSC

6-17 February 2023

Overview of IADC

- IADC is an international forum of national and international Space Agencies for the worldwide technical/scientific coordination of activities related to the issues of space debris in Earth orbit and provides technical recommendations

- IADC consists of a Steering Group and four specified Working Groups (WGs) covering measurements (WG1), environment and database (WG2), protection (WG3), and mitigation (WG4).

- The primary purposes of the IADC are
  - to exchange information on space debris research activities between member space agencies.
  - to facilitate opportunities for cooperation in space debris research.
  - to review the progress of ongoing cooperative activities.
  - to identify debris mitigation options

- IADC provides technical recommendations to the international space community. IADC is not a regulatory organization

(IADC public documents see http://www.iadc-home.org)

Membership

- IADC members are national or international space and state organizations **that carry out space activities**, through planning, designing, launching, or operating space objects.

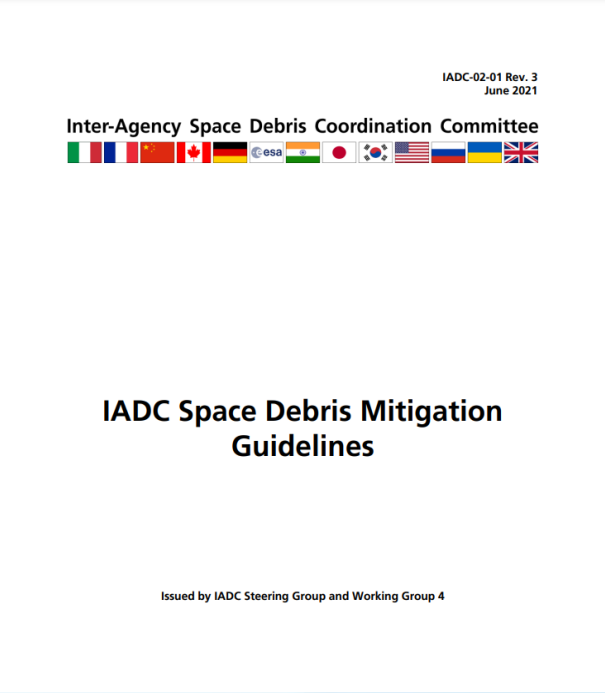
- IADC members **should actively undertake space debris research** activities and contribute to an increased understanding of space debris issues for the preservation of the orbital environment

Annual Meetings

- More than 100 technical experts from member agencies participate in the annual meetings to advance on the IADC action items
  - KARI hosted the meeting in 2022 on Jeju Island
  - ESA will host the next meeting in Darmstadt, Germany, in June 2023

IADC Core Products (IADC public documents see http://www.iadc-home.org)

Published in 2021/2022


IADC-02-01 Rev. 3
June 2021

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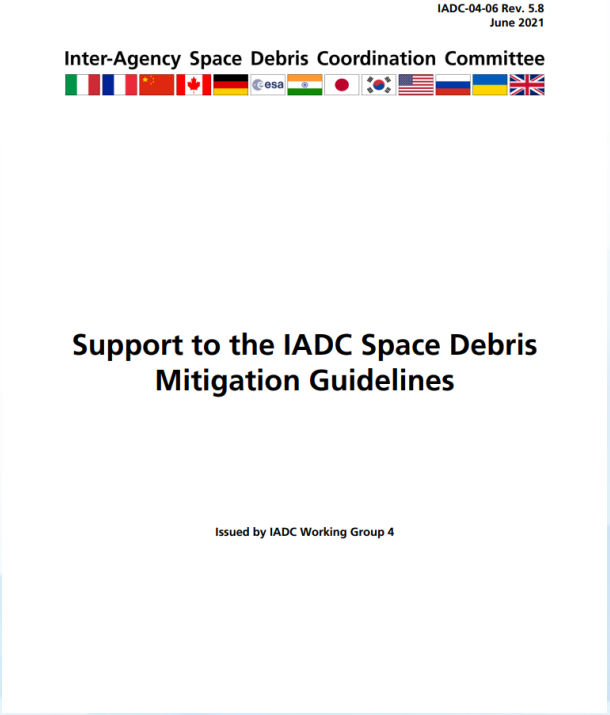
IADC Space Debris Mitigation Guidelines

Issued by IADC Steering Group and Working Group 4


IADC-04-06 Rev. 5.8
June 2021

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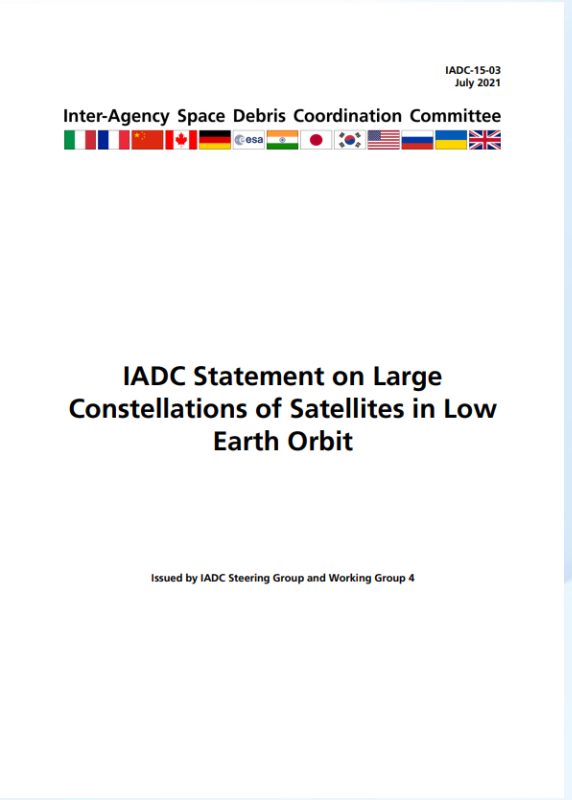
Support to the IADC Space Debris Mitigation Guidelines

Issued by IADC Working Group 4


IADC-15-03
July 2021

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IADC Statement on Large Constellations of Satellites in Low Earth Orbit

Issued by IADC Steering Group and Working Group 4

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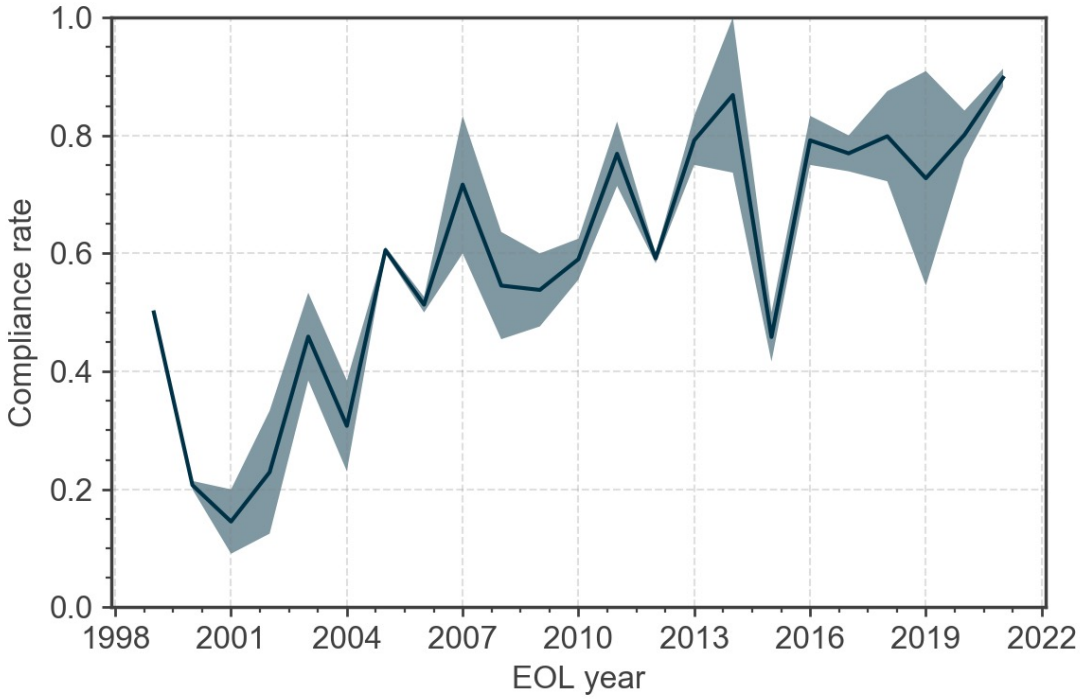
IADC Environment Report (1)

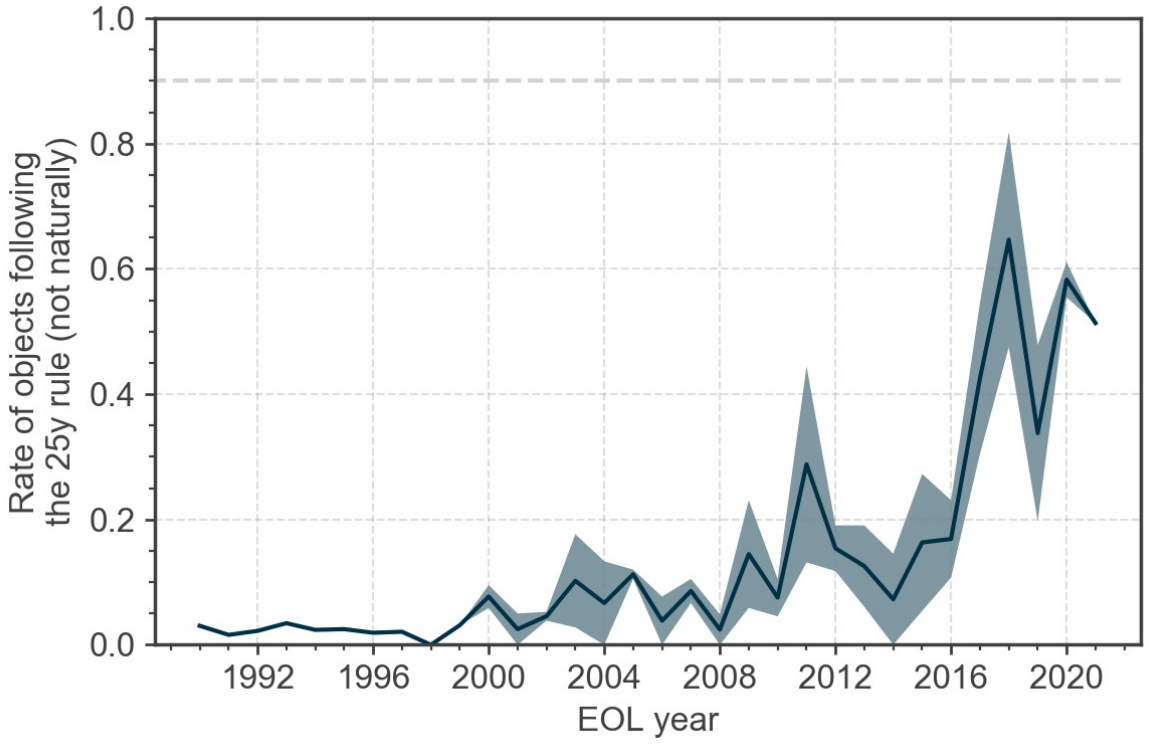
- New Product planned for annual release
- Overview of the on-going global debris mitigation efforts and the status of the environment
- For the awareness of space farers, decision takers and the interested public.
- See A/AC.105/C.1/2023/CRP.23

Disposal of spacecraft from GEO

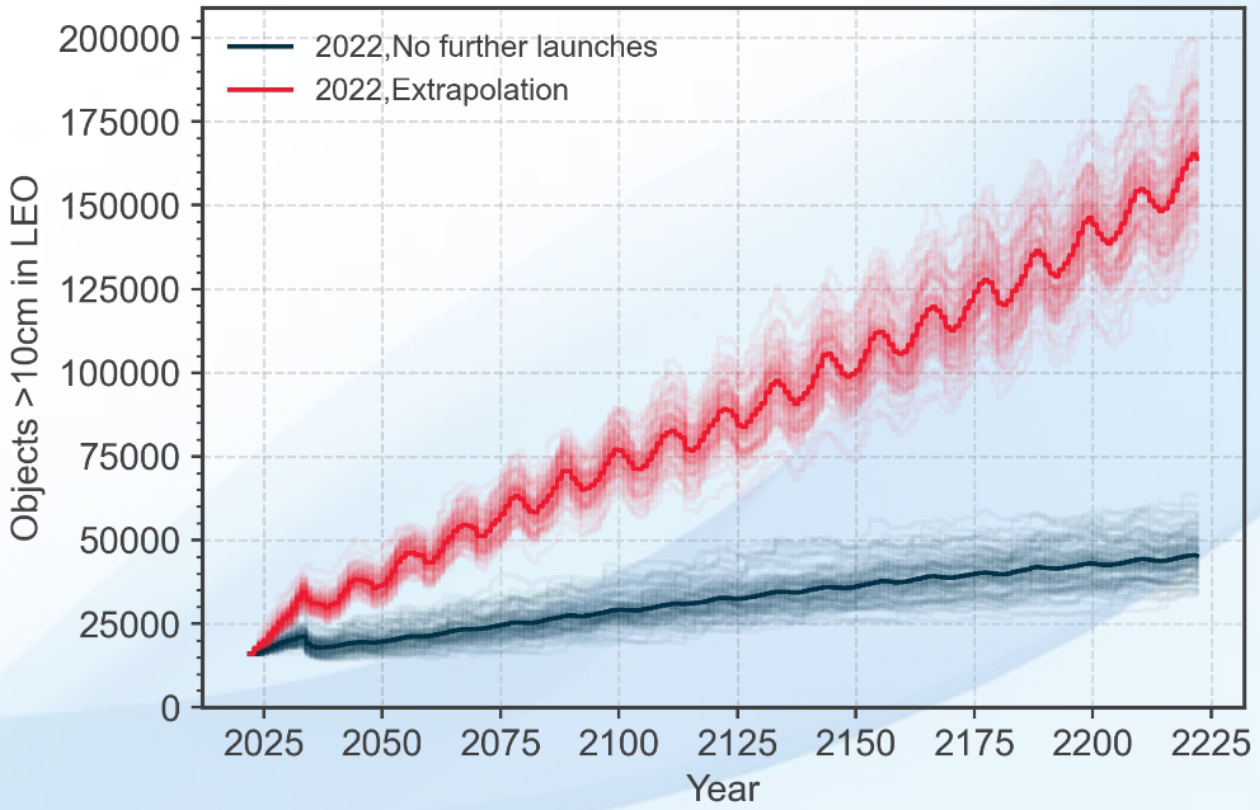


IADC Environment Report (2)

Disposal of spacecraft (requiring manoeuvre) from LEO



Resulting evolution of the environment



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IADC Statement on Active Debris Removal

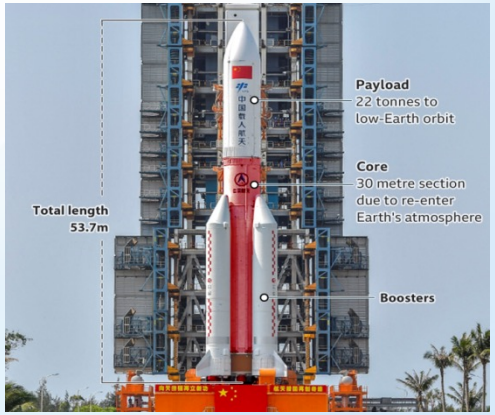
“IADC encourages:

- operators to follow existing orbital debris mitigation guidelines with a post mission disposal reliability as high as practicable but no less than 90%,
- further research and cost-risk-benefit analysis on active debris removal and to identify and demonstrate concepts and enabling technologies which can satisfy technical, economic and safety considerations with the goal of stabilizing the debris population
- newly launched spacecraft and upper stages to be ADR ready in case of PMD failure. “

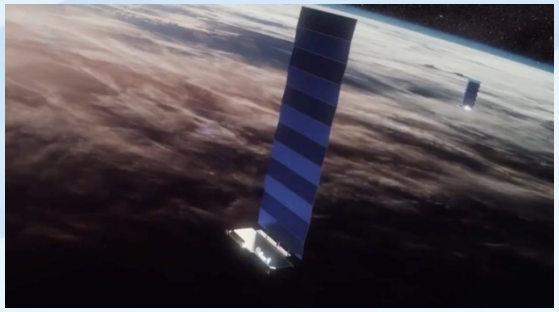
Re-entry Prediction Campaigns

To prepare for and respond to high risk re-entry events, the IADC members conduct annual object re-entry prediction campaigns for data sharing exercises and improvement of the prediction techniques.

- 27 campaigns have been conducted since 1998, including:
  - 2021-02 CZ-5B core stage (2021-035B, #48275), re-entered 09-May-2021 02:14 UTC
  - 2022-01 Starlink-24 satellite (2019-029D, #44238) re-entered 24-Oct-2022 05:01 UTC



Long March 5B rocket (*Credit: Xinhua/China Daily*)



Artistic representation of a Starlink satellite (*Credit: SpaceX*)

WG1 - Measurements

- The Working Group has performed an ad hoc analysis of the COSMOC-1408 intentional fragmentation and has achieved a complete collection of light curves of various interest objects
- Currently, the WG focusses on Attitude motion characterization of LEO upper stages using different observation techniques, Observations options to monitor Molniya-related debris and the preparation of a future beampark campaign
- Finally, work is in progress to establish exchange formats for astrometric and photometric data and to establish sustained and secure ways to exchange observational data among the IADC delegations

WG2 – Environment and Database

- Activities continued in 2022 for the Action Item on the Space Environment Index, addressing also index test cases in order to align the various proposals toward a common goal.
- Progress has been made for the IADC Report on the Space Debris Environment, which aims to analyze and document the state of the environment in a comprehensive and understandable report, to be published at regular intervals for the awareness of space operators, decision makers and the interested public.
- The study on the Environmental Impact of Large Constellations at Low LEO has been concluded, with valuable contributions received from several IADC members.

WG3 – Protection

- The Working Group has updated its Protection Manual to version 7.1 (internal document) to reflect results from the most recent environment models
- A Vulnerability Report is in progress which addresses ejecta, sensors systems and projectile shape effects on system vulnerability
- Future work will focus on principles for sharing experimental data, simulate micrometeoroid collision experiments at >10km/s and advanced shielding concepts

WG4 - Mitigation

- The Working Group has received a revision of the IADC Space Debris Mitigation Guidelines (rev 3) and Support Document (rev 5.8)
- Current work focusses on the development of a Space Environment Index and the analysis of disposal options from MEO (Medium Earth Orbit), as well as the disposal of high inclination geosynchronous spacecraft and orbital stages
- Future work will focus on the debris mitigation best practices for remediation action, debris mitigation in the lunar environment and recommendation on the orbital regions used by human missions

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Thank You!!