

Sustainable use of outer space: chances and challenges

DU TOIT Anja, LIPPITZ Berend
University of Graz, Austria

Space science and space application advance our knowledge of the universe and contributes to environmental and climate modelling, meteorological forecasting, management of natural resources, planetary defense, navigation and communication. Due to the increase in outer space activities the amount of space debris increases. Space debris is the collection of defunct man-made object in space and include old satellites, spend rocket stages and fragments from disintegration, erosion and collision. The Committee on the Peaceful Uses of Outer Space (COPUOS) has considered different aspects of the long-term sustainability of outer space activities. In 2010 the Scientific and Technical Subcommittee (STSC) established a Working Group on the Long-term Sustainability of Outer Space Activities and agreed on a first set of guidelines (A/71/20, Annex). Brought together with a second set of guidelines the full compendium will then be referred to the General Assembly in 2018.

IN NUMBERS

From Public Space Objects Catalogue

16879
TRACKED OBJECTS IN
EARTH ORBIT
LARGER THAN 10 CM

ALL OF THESE OBJECTS ARE MAN-MADE

LOWER LIMIT ON SIZE OF OBJECTS
TRACKABLE FROM
GROUND-BASED
RADAR NETWORKS

10cm

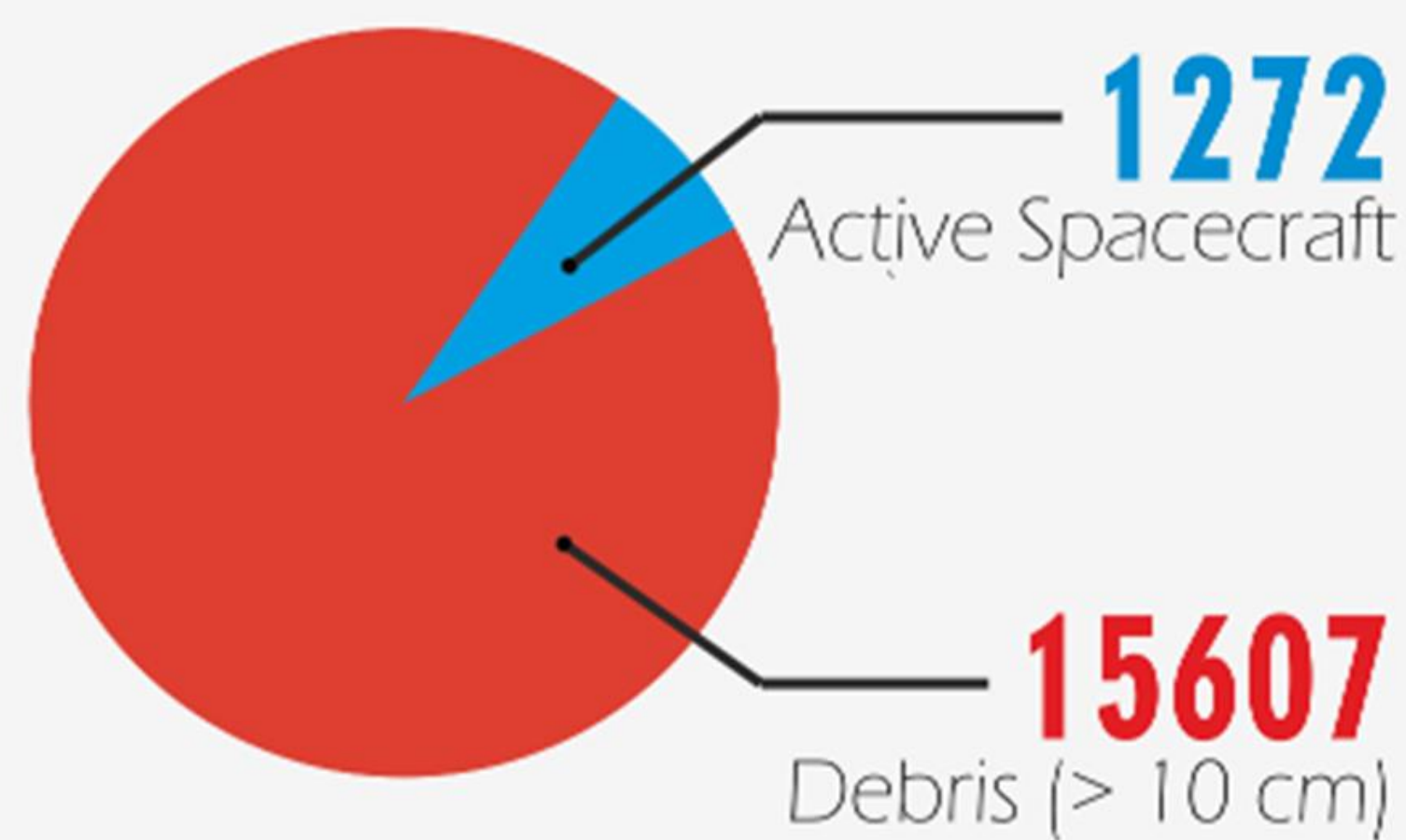
ORBITAL SPEED AT 370 KM

7.7 KM/S

Altitude of International Space Station (ISS)

IMPACT ENERGY OF 10 CM ALUMINIUM
SPHERE IN 10 KM/S COLLISION

300 Equivalent to
KG OF TNT



Estimated Total Number
of Objects in Earth Orbit

500,000

LARGER THAN 1 CENTIMETRE

THERE HAVE BEEN **200** KNOWN
SATELLITE
FRAGMENTATION EVENTS SINCE
SPACE ACTIVITIES BEGAN

Guidelines on Sustainable Use

Each mission *should* have a mitigation plan which addresses:

- (1) A management plan addressing space debris mitigation activities
- (2) A plan for the assessment and mitigation of risks related to space debris, including applicable standards
- (3) The measures minimizing the hazard related to malfunctions that have a potential for generating space debris
- (4) A plan for disposal of the spacecraft and/or orbital stages at end of mission
- (5) Justification of choice and selection when several possibilities exist
- (6) Compliance matrix addressing the recommendations of these Guidelines.

Mission should:

- (1) Limit debris released during normal operation
- (2) Minimize potential for breakups during operational phases
- (3) Limit probability of accidental collision
- (4) Avoid intentional destruction and other harmful activities
- (5) Minimize potential for post-mission break-ups due to stored energy
- (6) Limit long-term presence of spacecraft and launch vehicle orbital stages in LEO and GEO post-mission

Legal Issues

- (1) What is the legal status of “space debris”?
- (2) Justified State action or in-action?
 - (1) International obligations?
- (3) Jurisdiction or justification?
- (4) Consent required?
- (5) Common mission?

Conclusion

Space law is a developing field which continues to expand its boundaries as more and more players enter. As the number of objects in orbit increase, so too does the amount of space debris in orbit. This increase in uncontrolled man-made objects poses a risk to functional satellites and other space objects. When space objects encounter debris and become damaged, the question becomes a complex legal analysis containing factors that are not yet defined in Space Law. The international community must set transparent guidelines as to just what constitutes space debris and how states should contribute to the long-term sustainability of outer-space activities.

References:

Joyeeta Chatterjee, McGill Univ., Institute of space law, „Legal issues relating to unauthorized space debris remediation“ (<https://iislweb.org/docs/Diederiks2014a.pdf>)
Simon George and Benjamin Schwarz, Univ. of south Hampton research group, http://www.unoosa.org/oosa/osoindex/index.aspx?f_id
UNOOSA, http://www.unoosa.org/pdf/publications/st_space_49E.pdf
IADC Space Debris Mitigation Guidelines, http://www.iadc-online.org/index.cgi?item=docs_pub, action number item 22.4



ECSL

European Centre for Space Law