3
2024

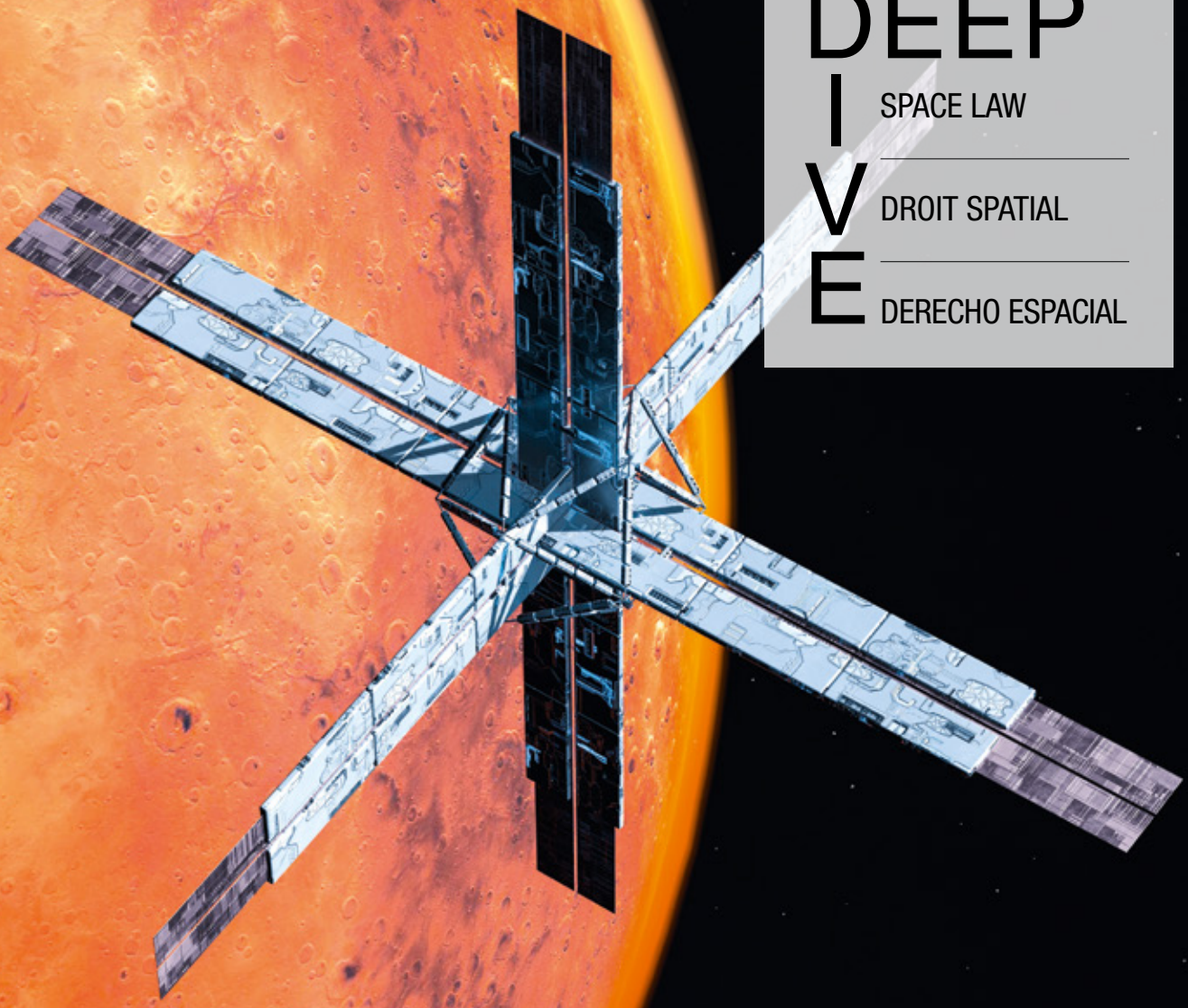
Juriste INTERNATIONAL

DEEP DIVE

SPACE LAW

DROIT SPATIAL

DERECHO ESPACIAL



UIA
Union Internationale des Avocats
International Association of Lawyers
Unión Internacional de Abogados

LexisNexis®

Management of Space Debris

Frédéric FORSTER

Alors que nous utilisons les avantages de la croissance des industries dans l'espace extra-atmosphérique, y compris les impacts positifs sur l'économie mondiale, la fourniture d'avantages sociétaux, le soutien des activités de protection de l'environnement et la garantie de la souveraineté stratégique, l'accumulation de débris en orbite pose de sérieux risques. Quelle que soit leur taille, ils peuvent infliger de graves dommages, y compris à des engins spatiaux habités comme la Station spatiale internationale (ISS). Enfin, des organisations mondiales ont adopté des lignes directrices sur la réduction des débris spatiaux et des pays ont mis en place des autorités de régulation.

Si bien estamos aprovechando los beneficios del crecimiento de las industrias en el espacio ultraterrestre, incluidos los impactos positivos en la economía mundial, la provisión de beneficios sociales, el apoyo a las actividades de protección del medio ambiente y una garantía de soberanía estratégica, la acumulación de desechos en órbita plantea graves riesgos. Sea cual sea su tamaño, pueden infligir graves daños, incluso a naves espaciales tripuladas como la Estación espacial internacional (ISS). Finalmente, las organizaciones mundiales han adoptado directrices sobre la reducción de los desechos espaciales y los países han establecido autoridades reguladoras.

Introduction

The use of space has contributed to strengthening the global economy, providing societal benefits, supporting environmental protection activities, and guaranteeing strategic sovereignty. Consequently, many economic sectors and activities rely on the protection of space-based devices and instruments against threats, such as those posed by space weather phenomena, Near Earth Objects (NEOs), or human-made space debris. Since the Committee on the Peaceful Uses of Outer Space (COPUOS) published its technical report on space debris in 1999, there has been general agreement that the current debris situation creates huge risks to spacecrafts orbiting the Earth.

Inter-Agency Space Debris Coordination Committee (IADC) Guidelines

In 2003, the Inter-Agency Space Debris Coordination Committee (IADC) adopted space debris mitigation guidelines.[1] These guidelines state that organizations seeking to implement a space project should define a space debris reduction plan for each program. The mitigation plan should include a management plan addressing activities to achieve space debris mitigation; a plan for the assessment and mitigation of risks related to space debris, which includes applicable standards; measures that minimize the hazards related to malfunctions that have a potential for generating space debris; a plan for disposal of the space system at the end of the mission; justification for the project and selection of its choices when several possibilities exist; and compliance matrix addressing these guidelines.

Committee on the Peaceful Uses of Outer Space (COPUOS) Guidelines

In 2007, COPUOS, aware of the benefits of a series of high-level, qualitative guidelines, also developed a set of seven space debris mitigation guidelines[2] that should be considered for mission planning, design, manufacture, and the operational (launch, mission, and disposal) phases of spacecraft and the launch of vehicles into orbital stages. These guidelines could be used to:

- Limit debris released during space operations.

1. https://www.unoosa.org/oosa/oosadoc/data/documents/2003/aac.105c.1l/aac.105c.1l.260_0.html

2. https://www.unoosa.org/oosa/oosadoc/data/documents/2010/stspace/stspace49_0.html

- Minimize the potential for break-ups during operational phases.
- Limit the probability of accidental collisions in orbit.
- Avoid intentional destruction and other harmful activities.
- Minimize the potential for post-mission break-ups resulting from stored energy.
- Limit the long-term presence of spacecraft and launch vehicle orbital stages in the low-Earth orbit (LEO) region after the end of the mission.
- Limit the long-term interference of spacecraft and launch vehicle orbital stages with the geosynchronous Earth orbit (GEO) region after the end of the mission.

Supervisory and Regulatory Authorities

Guidelines adopted must be followed by all entities involved in the use of space and producing space objects and debris. That is why supervisory and regulatory authorities are necessary to control and regulate communications since space objects depend on satellites.

European Union

In the European Union, communications regulation remains essential at the level of the Union's member states. Moreover, EU member states generally distinguish between institutions that regulate the container and content-regulating institutions. In France, for example, the regulation activities are led by two independent administrative authorities : Autorité de Régulation des Communications Electroniques, des Postes et de la distribution de la Presse (Arcep) and Autorité de régulation de la communication audiovisuelle et numérique (Arcom).

Arcep regulates the electronic communications, postal, and press distribution sectors. It ensures that the dynamics and interests of private operators are reconciled with the objectives of regional connectivity, competitiveness, and the effective and fair competition between operators for the benefit of end-users.

In the European Union, communications regulation remains essential at the level of the Union's member states.

Arcom allocates frequencies assigned to the audiovisual sector and guarantees reception quality for the public and optimal conditions of use for professionals, among other responsibilities. Arcom is also called upon to intervene on issues linked to the activity of online platforms, notably in the fight against the manipulation of information or online hate.

United States

In the U.S., the U.S. Federal Communications Commission (FCC) regulates the content of telecommunications. Compared to its European counterparts, the FCC has a broad jurisdiction. It imposes substantial principles on telecom operators, such as decency, which it monitors itself. The FCC also regulates satellite communications.

Sanctions

The U.S. government imposed the first ever fine for space debris on 2 October 2023, as the FCC fined a satellite operator $150,000 (about 143,000 Euros) for abandoning space debris in an orbit deemed unsafe.[3]

Overview of the Space Debris Situation

At the end of 2023, the European Space Agency (ESA) estimated that more than 640 cases of "break-ups, explosions, collisions or abnormal events resulting in fragmentation" occurred.[4] Despite the fact that all objects are tracked and catalogued, the number of debris objects in orbit, estimated based on statistical models, are 36,500 space debris objects greater than 10 cm, 1,000.000 space debris objects from greater than 1 cm to 10 cm, and 130 million space debris objects from greater than 1 mm to 1 cm.

The accumulation of debris in orbit can inflict serious damages, including to manned spacecraft, such as the International Space Station (ISS). As such, Space Situation Tracking (SST), which includes the cataloguing

3. https://www.fcc.gov/document/fcc-takes-first-space-debris-enforcement-action

4. https://www.esa.int/Space_Safety/Space_Debris/Space_debris_by_the_numbers

and analysis of space objects, is essential for protecting against debris threats.

European Union's Approach to Surveillance and Tracking of Space Objects

In 2021, the EU Space Situation Tracking (EU SST) program was established as a fully-fledged security subcomponent of the EU Space Situational Awareness (SSA) program. Created by regulation (EU) 2021/696 of 28 April 2021, the Union Space Programme and the European Union Agency for the Space Programme were established. The EU SST has three main functions: sensing, processing, and service providing.

The accumulation of debris in orbit can inflict serious damages, including to manned spacecraft, such as the International Space Station (ISS).

Schematically speaking, Member States' sensors provide data that is analyzed as a processing function and then input into a common database. From this database, products are derived for the services provided by operation centers (OCs) and supplied to users via the SST service provision portal.

Sensing Function

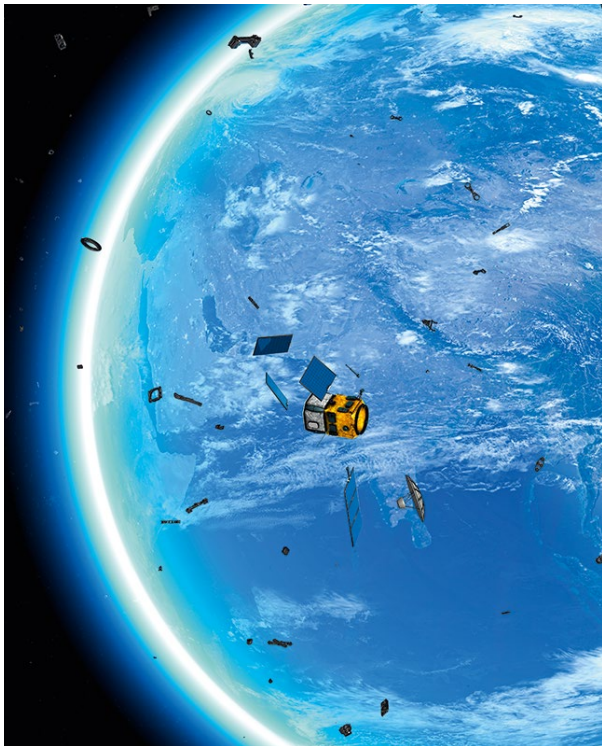
The sensing function of this network consists of sensors for monitoring and tracking space objects in all orbital regimes. At the start of 2021, the system was based on 51 surveillance or tracking sensors, which come in three types: radars (e.g. French Graves radar or the German TIRA radar), optical telescopes (e.g. European Space Agency's OGS telescope), and satellite-based laser telemetry stations (e.g. Matera in Italy).

Processing Function

The processing function aims to coordinate data sharing between the various observation centers via a common database, and to process thousands of daily measurements yielded from sensors contributing to the EU SST database. This data forms the basis of a future EU SST catalogue, which will be used for SST services. Germany is responsible for hosting the EU SST database and producing the future EU SST catalogue.

Service Providing

The service providing function is responsible for providing three SST services to authorized users: collision avoidance, re-entry analysis, and fragmentation analysis. These services are accessible from the SST supply portal, managed by the EUSPA, which acts as a counter. Currently, the French and Spanish OCs are responsible for the collision avoidance service, while the Italian OC oversees



the re-entry and fragmentation analysis services. More than 190 organizations benefit from these services, and over 400 satellites are protected against the risk of collision. On average, more than one major event, including collisions between space objects, is avoided per day by EU SST.[5]

Conclusion

The management of space debris is important because of the proliferation of space debris, the growing threat it poses to the safety of space operations, and the need to ensure the long-term sustainability of the space environment.

For example, in France, the *Centre national d'études spatiales* (CNES) warns that *"If nothing is done, the doors to space, too crowded, could well close and make all travel outside the Earth impossible."*

Thus, the management of space debris is not only a requirement of operational safety and environmental protection, but also a driver of necessary international cooperation to achieve technological progress. It is imperative that governments, international organizations, and private players work together to strengthen and improve space debris management regulations and practices. ■

Frédéric FORSTER
Avocat, Lexing Alain Bensoussan Avocats
Paris, France
federic-forster@lexing.law

5. https://www.eusst.eu/wp-content/uploads/2023/11/EUSST_Fact-sheet_2023.pdf