



# INTRODUÇÃO À GEOPOLÍTICA AEROESPACIAL

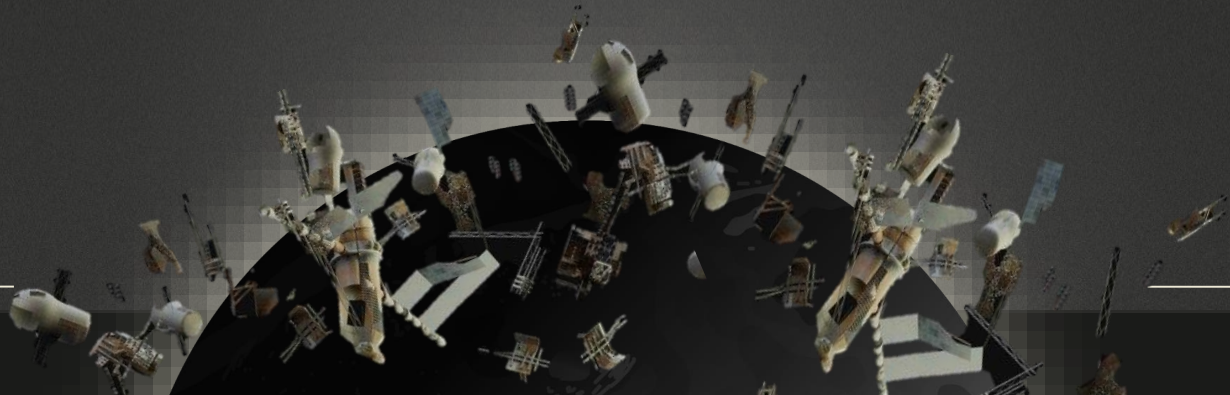


Instituto do Legislativo Paulista  
Assembleia Legislativa do Estado de São Paulo



# DETRITOS ESPACIAIS: IMPACTOS E GOVERNANÇA INTERNACIONAL

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Brasileiro

01

# Introdução





# Contexto histórico

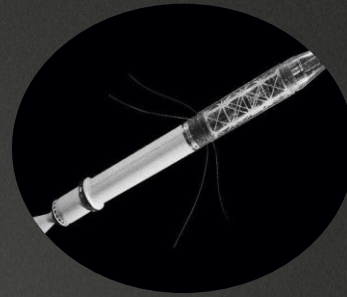
# ERA ESPACIAL



**SPUTNIK 1**

83,6kg

Lançado em 04 de outubro de  
1957 pela URSS



**EXPLORER 1**

14kg

Lançado em 31 de janeiro de  
1958 pelos EUA

# DIREITO ESPACIAL INTERNACIONAL



1967

Tratado sobre os Princípios  
Reguladores das Atividades dos  
Estados na Exploração e Uso do  
Espaço Exterior, inclusive a Lua e  
demais Corpos Celestes



1968

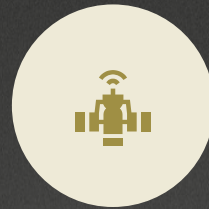
Acordo sobre Salvamento de  
Astronautas e Restituição de  
Astronautas e Objetos lançados  
ao Espaço Cósmico

# DIREITO ESPACIAL INTERNACIONAL



1972

Convenção sobre  
Responsabilidade  
Internacional por Danos  
Causados por Objetos  
Espaciais



1976

Convenção sobre Registro de  
Objetos lançados ao Espaço  
Cósmico



1984

Acordo sobre as Atividades  
dos Estados na Lua e nos  
Corpos Celestes

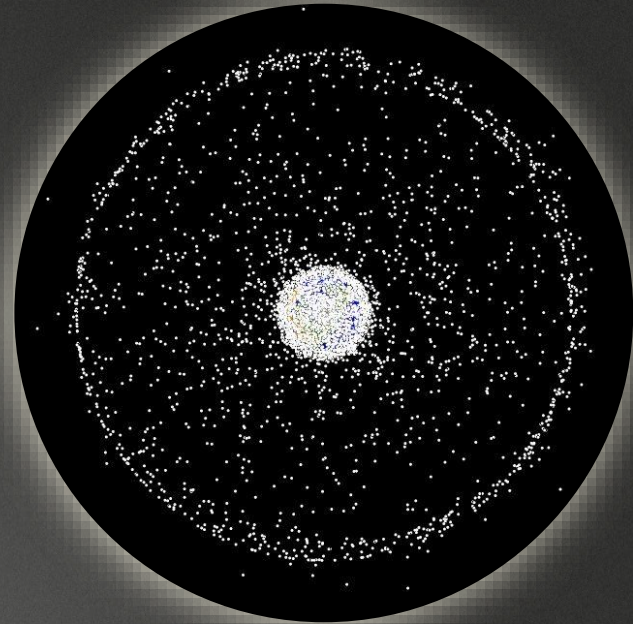




# DETRITOS ESPACIAIS

# Denominação

São chamados de lixos, resíduos, dejetos espaciais ou, em inglês, *space debris*, *orbital debris* ou *space junk*



A central image showing a dense field of space debris of various sizes and shapes surrounding a glowing blue and white Earth. The debris is set against a dark background filled with stars. A white rectangular border frames the central scene. On the left and right sides, there are large black circular areas containing white arrows pointing left and right respectively.

# DETRITOS ESPACIAIS

## Artificial X Natural

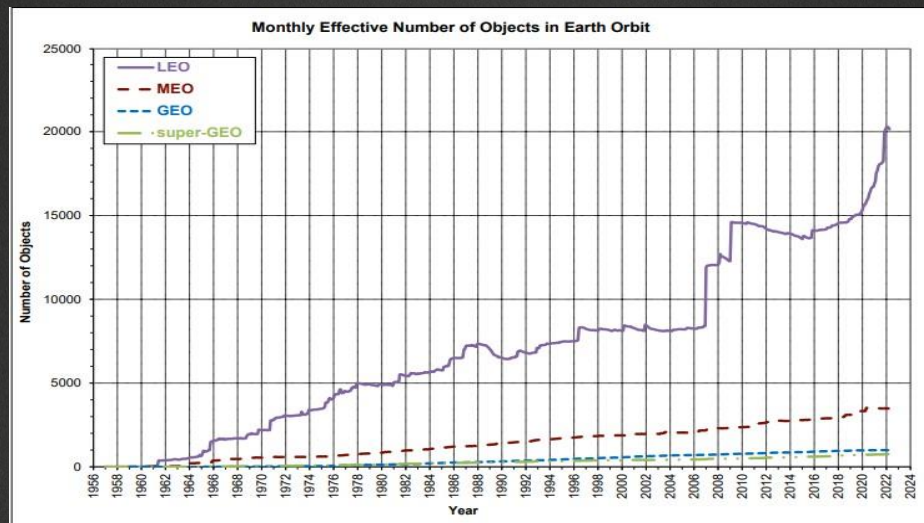


# NÚMERO DE DETRITOS NAS ÓRBITAS TERRESTRES

AGÊNCIA ESPACIAL	NÚMERO DE DETRITOS ESPACIAIS MONITORADOS	DETRITOS ESPACIAIS > 10 CM	DETRITOS ESPACIAIS ENTRE 1CM A 10CM	DETRITOS ESPACIAIS ENTRE 1MM A 1CM
ESA	35.220	36.500	1.000.000	130.000.000
NASA	> 27.000	23.000	500.000	100.000.000

Fonte: ESA (2023) e GARCIA (2021)

# NÚMERO DE DETRITOS POR ÓBITAS TERRESTRES




Fonte: Nasa ODPO (2022)

# DIRETRIZES DE MITIGAÇÃO DE DETRITOS ESPACIAIS

IADC-02-01  
Revision 2  
Mar 2020

**Inter-Agency Space Debris Coordination Committee**




**IADC Space Debris Mitigation Guidelines**

Issued by IADC Steering Group and Working Group 4

**UNITED NATIONS  
OFFICE FOR OUTER SPACE AFFAIRS**

**Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space**



**U.S. Government  
Orbital Debris Mitigation Standard Practices, November 2019 Update**

**PREAMBLE**

The United States Government (USG) Orbital Debris Mitigation Standard Practices (ODMSP) were established in 2001 to address the increase in orbital debris in the near-Earth space environment. The goal of the ODMSP was to limit the generation of new, long-lived debris by the control of debris released during normal operations, minimizing debris generated by accidental explosions, the selection of safe flight profile and operational configuration to minimize accidental collisions, and postmission disposal of space structures. While the original ODMSP adequately protected the space environment at the time, the USG recognizes that it is in the interest of all nations to minimize new debris and mitigate effects of existing debris. This fact, along with increasing numbers of space missions, highlights the need to update the ODMSP and to establish standards that can inform development of international practices.

This 2019 update includes improvements to the original objectives as well as clarification and additional standard practices for certain classes of space operations. The improvements consist of a quantitative limit on debris released during normal operations, a probability limit on accidental explosions, probability limits on accidental collisions with large and small debris, and a reliability threshold for successful postmission disposal. The new standard practices established in the update include the preferred disposal options for immediate removal of structures from the near-Earth space environment, a low-risk geosynchronous Earth orbit (GEO) transfer disposal option, a long-term reentry option, and improved move-away-and-stay-away storage options in medium Earth orbit (MEO) and above GEO. The update also incorporates new sections to clarify and address operating practices for large constellations, rendezvous and proximity operations, small satellites, satellite servicing, and other classes of space operations. The updated standard practices are significant, meaningful, and achievable. The 2019 ODMSP, by establishing guidelines for USG activities, provides a reference to promote efficient and effective space safety practices for other domestic and international operators. The USG intends to update and refine the ODMSP as necessary in the future to address advances in both technology and policy.

The USG will follow the ODMSP, consistent with mission requirements and cost effectiveness, in the procurement and operation of spacecraft, launch services, and the conduct of tests and experiments in space. When practical, operators should consider the benefits of going beyond the standard practices and take additional steps to limit the generation of orbital debris. Together with continued development of standards and best practices for space traffic management, the updated ODMSP will contribute to safe space operations and the long-term sustainability of space activities.

# PAÍSES QUE MAIS PRODUZEM DETRITOS ESPACIAIS



Fonte: RS (2020, online).



02

# Impactos





# TIPOS DE IMPACTOS

- Impactos ambientais
- Impactos sociais
- Impactos políticos
- Impactos econômicos



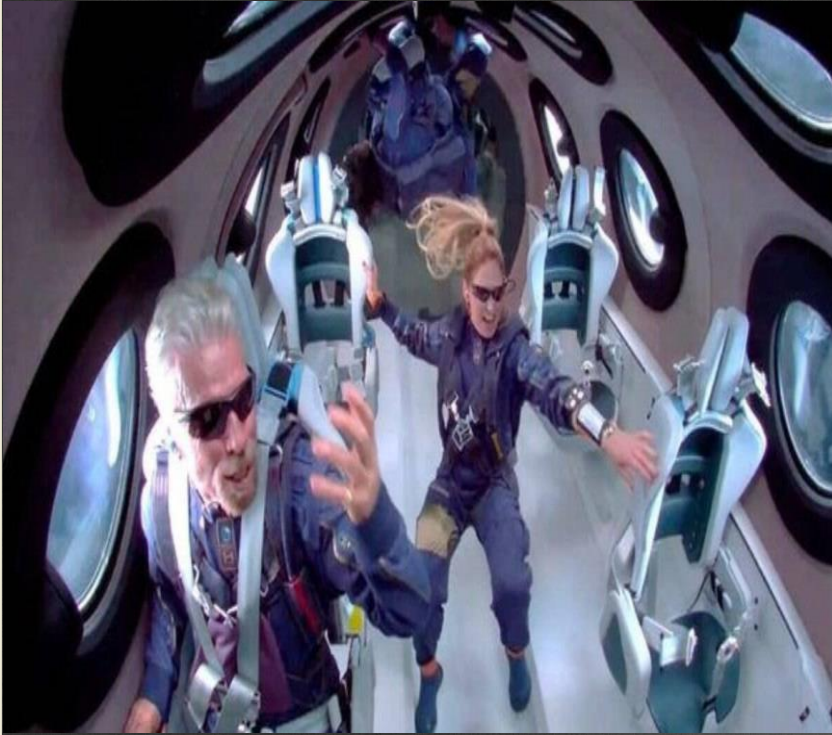
# AMBIENTAIS



# AMBIENTAIS



# SOCIAIS



# SOCIAIS



# POLÍTICOS

UNITED NATIONS  
OFFICE FOR OUTER SPACE AFFAIRS

## INTERNATIONAL SPACE LAW: UNITED NATIONS INSTRUMENTS



UNITED NATIONS

# POLÍTICOS



# ECONÔMICOS





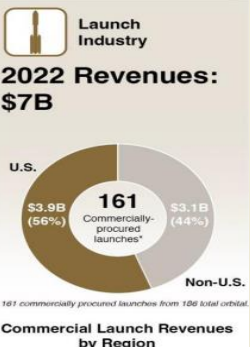
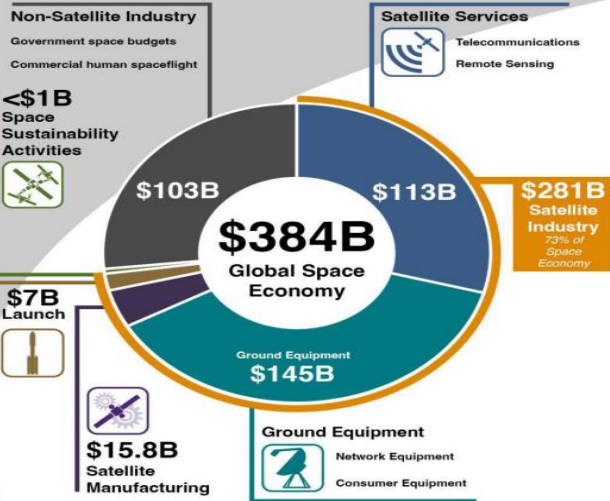
# ECONÔMICOS



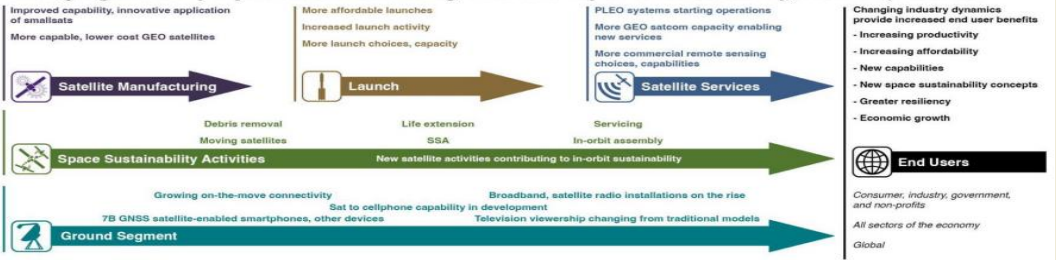
## 2022 Global Satellite Industry Revenues

### The Satellite Industry in Context

(2022 revenues worldwide in billions of U.S. dollars)



### Changing Industry Dynamics: Increasing Affordability and Productivity, New Capabilities



03

# Posição brasileira



# Comitê sobre o Uso Pacífico do Espaço Exterior: 2023

- Criação de um Conselho Espacial Nacional em outubro de 2022;
- Criação de uma Lei Geral de Atividades Espaciais brasileiras (Projeto de Lei nº 1006/22);
- Compromisso em estabelecer cooperação internacional em prol do desenvolvimento sustentável das atividades espaciais para uso pacífico do espaço exterior.



04

←

Relevância para o  
Programa Espacial  
Brasileiro

→

- ❑ Proteção e preservação do meio ambiente espacial, conforme os artigos 23, inciso VI e 225 da Constituição Federal de 1988 e artigo 9º do Tratado do Espaço Exterior;
- ❑ Proteção à vida, à segurança e à propriedade, segundo o artigo 5º da Constituição Federal de 1988;
- ❑ Garantia da exploração e uso do espaço, consoante os artigos 1º e 9º do Tratado do Espaço e artigos 3º e 21, inciso XII, alínea c da CF/88;
- ❑ Proteção à soberania nacional, à integridade territorial e à segurança e defesa do país, conforme artigos 1º, inciso I, 4º, inciso VI, 22, inciso I e X, 178 da CF/88.

# Thanks!

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