National Aeronautics and Space Administration

Orbital Debris Mitigation and U.S. Space Policy Directive-3

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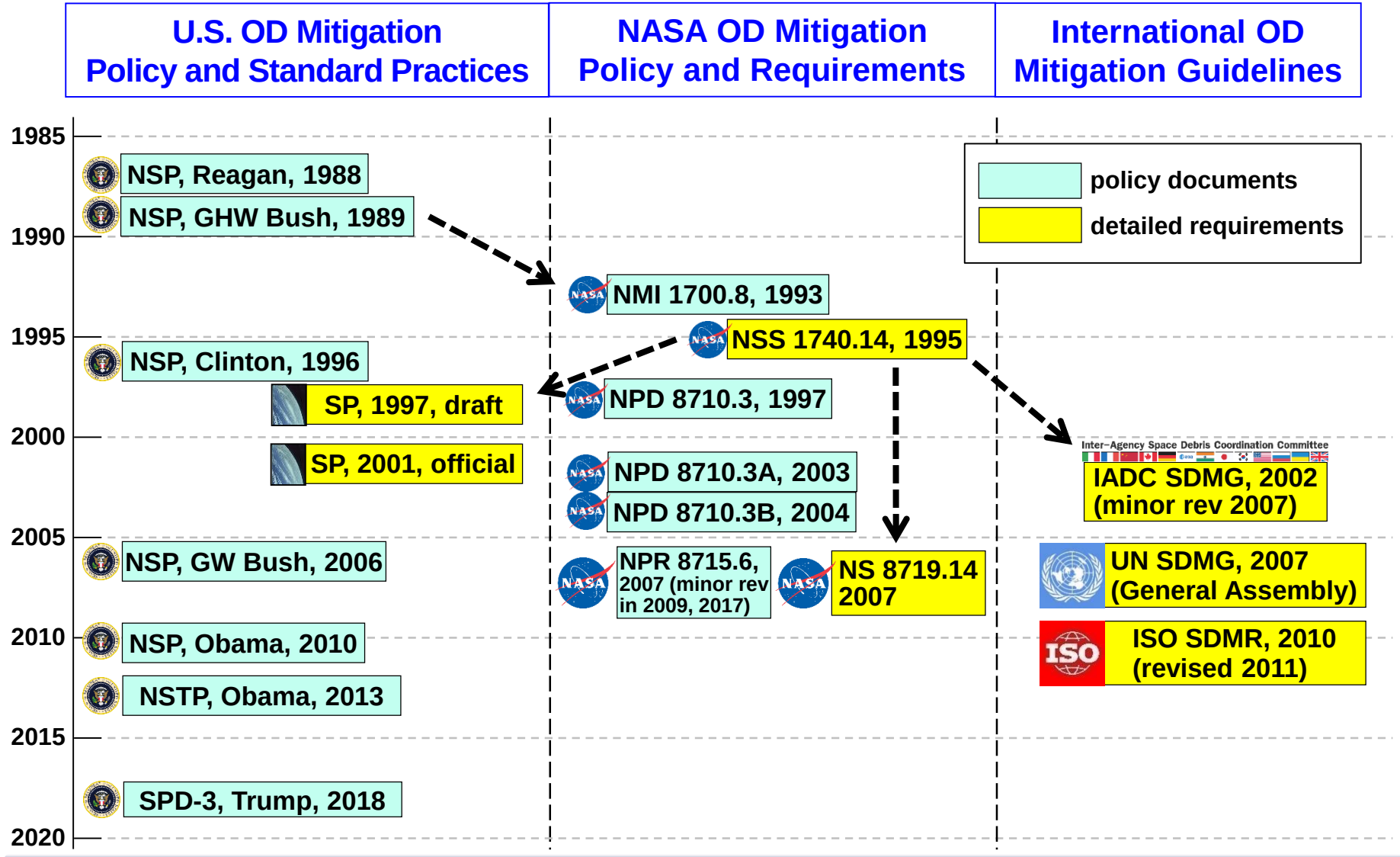
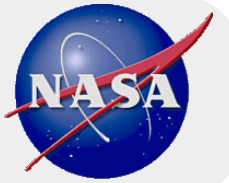
56th Session of the Scientific and Technical Subcommittee
Committee on the Peaceful Uses of Outer Space, United Nations
11-22 February 2019, Vienna

History of U.S., NASA, and International Orbital Debris Mitigation Policies and Requirements



U.S. National Space Policy and Orbital Debris

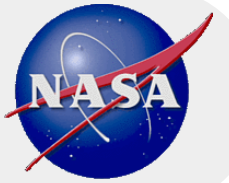


- **Orbital debris has been included in all national space policies since 1988**

  "*All space sectors will seek to minimize the creation of space debris. Design and operations of space tests, experiments, and systems will strive to minimize or reduce the accumulation of space debris consistent with mission requirements and cost effectiveness*."

  (1988 National Space Policy)

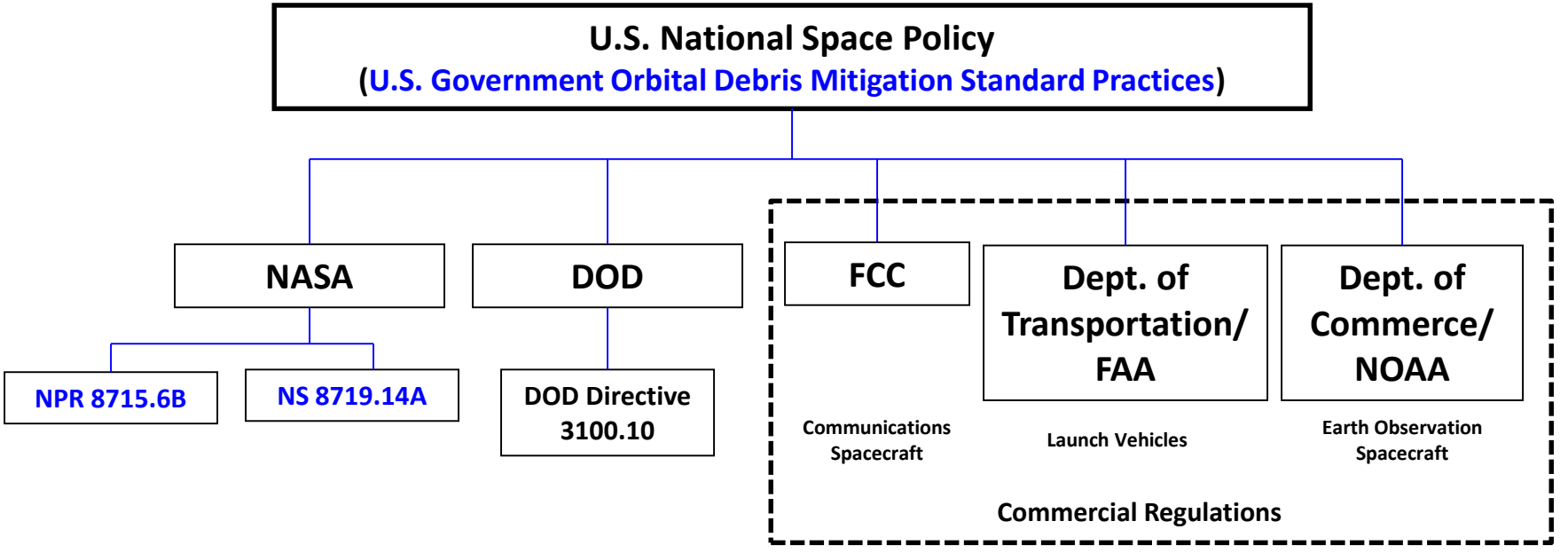
Orbital Debris Mitigation at NASA



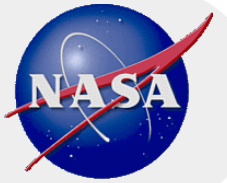
- **NASA was the first organization in the world to develop specific orbital debris mitigation requirements for near-Earth space missions**
  - NASA Management Instruction (NMI) 1700.8 "Policy for Limiting Orbital Debris Generation" was established in 1993
  - NASA Safety Standard (NSS) 1740.14 "Guidelines and Assessment Procedures for Limiting Orbital Debris" established the first detailed set of mitigation guidelines for NASA missions in 1995
    - **The 25-year rule for LEO-crossing upper stages and spacecraft**
    - **The 8 m^2 debris casualty area limit (derived from the 1:10,000 human casualty risk threshold) for random reentry events**
    - ***Etc.***

U.S. Government Orbital Debris Mitigation Standard Practices

- **NASA and DOD led the effort to establish the U.S. Government (USG) Orbital Debris Mitigation Standard Practices (approved in 2001)**
- **The U.S. National Space Policies of 2006 and 2010, as amended by SPD-1, direct agencies and departments to implement the USG Orbital Debris Mitigation Standard Practices**



Recent U.S. National Space Policies – 2006 and 2010



"*Departments and agencies shall continue to follow the United States Government Orbital Debris Mitigation Standard Practices, consistent with mission requirements and cost effectiveness, in the procurement and operation of spacecraft, launch services, and the operation of tests and experiments in space*;

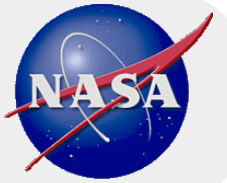
The Secretaries of Commerce and Transportation, in coordination with the Chairman of the Federal Communications Commission, shall continue to address orbital debris issues through their respective licensing procedures;"

(2006 National Space Policy)

"Continue to follow the United States Government Orbital Debris Mitigation Standard Practices, 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;"

(2010 National Space Policy, as amended by SPD-1)

U.S. Space Policy Directive-3



- **On June 18, 2018, during the third meeting of the National Space Council, the President signed Space Policy Directive-3, the first National Space Traffic Management Policy**
  - https://www.federalregister.gov/documents/2018/06/21/2018-13521/national-space-traffic-management-policy

- **The policy provides guidelines and direction on space traffic management generally, and contains key references and guidelines specific to orbital debris**

Space Policy Directive-3

Threat from Orbital Debris

Sec. 3. Principles

(c) Orbital debris presents a growing threat to space operations. Debris mitigation guidelines, standards, and policies should be revised periodically, enforced domestically, and adopted internationally to mitigate the operational effects of orbital debris.

Space Policy Directive-3

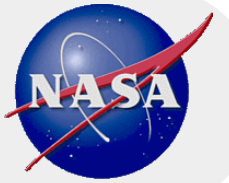
Space Situational Awareness

Sec. 4. Goals

(a) Advance SSA and STM Science and Technology. The United States should continue to engage in and enable S&T research and development to support the practical applications of SSA and STM. These activities include improving fundamental knowledge of the space environment, such as the characterization of small debris, advancing the S&T of critical SSA inputs such as observational data, algorithms, and models necessary to improve SSA capabilities, and developing new hardware and software to support data processing and observations.

Space Policy Directive-3

Mitigate the Effects of Orbital Debris

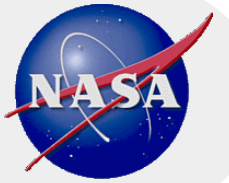


Sec. 4. Goals

(b) Mitigate the effect of orbital debris on space activities. The volume and location of orbital debris are growing threats to space activities. It is in the interest of all to minimize new debris and mitigate effects of existing debris. This fact, along with increasing numbers of active satellites, highlights the need to update existing orbital debris mitigation guidelines and practices to enable more efficient and effective compliance, and establish standards that can be adopted internationally. These trends also highlight the need to establish satellite safety design guidelines and best practices.

Space Policy Directive-3

USG Orbital Debris Mitigation Standard Practices



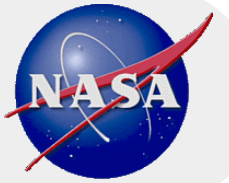
Sec. 5. Guidelines

(a) (iii) Mitigating Orbital Debris. It is in the interest of all space operators to minimize the creation of new orbital debris. Rapid international expansion of space operations and greater diversity of missions have rendered the current U.S. Government Orbital Debris Mitigation Standard Practices (ODMSP) inadequate to control the growth of orbital debris. These standard practices should be updated to address current and future space operating environments.

The United States should develop a new protocol of standard practices to set broader expectations of safe space operations in the 21st century. This protocol should begin with updated ODMSP, but also incorporate sections to address operating practices for large constellations, rendezvous and proximity operations, small satellites, and other classes of space operations. These overarching practices will provide an avenue to promote efficient and effective space safety practices with U.S. industry and internationally.

Space Policy Directive-3

Global Engagement



Sec. 5. Guidelines

(c) (iii) Global Engagement. In its role as a major spacefaring nation, the United States should continue to develop and promote a range of norms of behavior, best practices, and standards for safe operations in space to minimize the space debris environment and promote data sharing and coordination of space activities. It is essential that other spacefaring nations also adopt best practices for the common good of all spacefaring states. The United States should encourage the adoption of new norms of behavior and best practices for space operations by the international community through bilateral and multilateral discussions with other spacefaring nations, and through U.S. participation in various organizations such as the Inter-Agency Space Debris Coordination Committee, International Standards Organization, Consultative Committee for Space Data Systems, and UN Committee on the Peaceful Uses of Outer Space.

Space Policy Directive-3

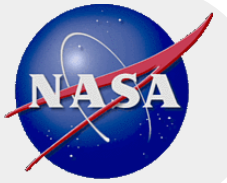
USG ODMSP Update

Sec. 6. Roles and Responsibilities

(b) Mitigate the Effect of Orbital Debris on Space Activities.

(i) The Administrator of the National Aeronautics and Space Administration (NASA Administrator), in coordination with the Secretaries of State, Defense, Commerce, and Transportation, and the Director of National Intelligence, and in consultation with the Chairman of the Federal Communications Commission (FCC), shall lead efforts to update the U.S. Orbital Debris Mitigation Standard Practices and establish new guidelines for satellite design and operation, as appropriate and consistent with applicable law.

Summary



- **The U.S. has been a global leader in developing orbital debris mitigation policy and best practices for more than 30 years**

- **The Space Policy Directive-3 highlights again the commitment of the U.S. to mitigate the threat from orbital debris**
  - Improve fundamental knowledge of the space environment
  - Update USG ODMSP, including elements for new classes of space operations
  - Promote best practices with the global community
  - Support space situational awareness and space traffic management

Acronyms

DoD	U.S. Department of Defense
FAA	U.S. Federal Aviation Administration
FCC	U.S. Federal Communications Commission
IADC	Inter-Agency Space Debris Coordination Committee
ISO	International Organization for Standardization
LEO	Low Earth Orbit
NMI	NASA Management Instruction
NOAA	U.S. National Oceanic and Atmospheric Administration
NPD	NASA Policy Directive
NPR	NASA Procedural Requirements
NS	NASA Standard
NSP	National Space Policy
NSS	NASA Safety Standard
NSTP	National Space Transportation Policy
OD	Orbital Debris
ODMSP	Orbital Debris Mitigation Standard Practices
SDMG	Space Debris Mitigation Guidelines
SDMR	Space Debris Mitigation Requirements
SP	Standard Practices
SPD	Space Policy Directive
USG	U.S. Government