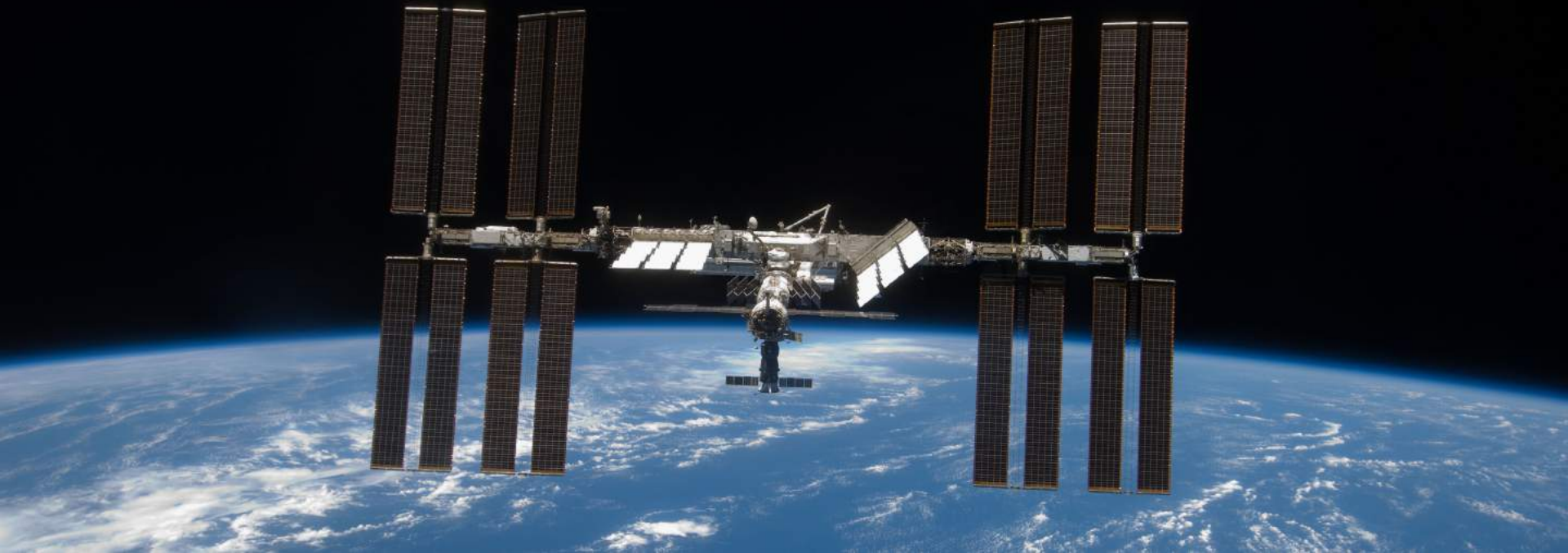


# SECURE SPACE - SECURE WORLD

## SECURING OUR COMMON FUTURE ON EARTH AND OUR SHARED DESTINY IN SPACE



# THE CONTEXT: SPACE BENEFITS FOR HUMANITY

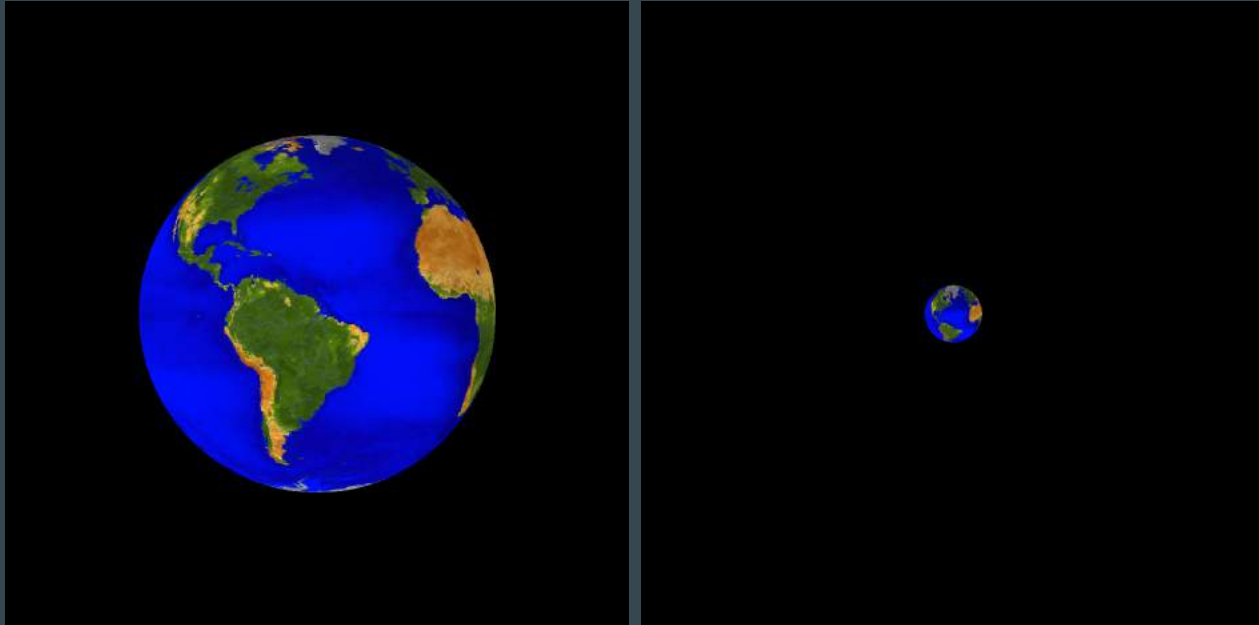


# THE GOAL: HUMAN & ENVIRONMENTAL SECURITY



# THE ISSUES: ORBITAL CONGESTION

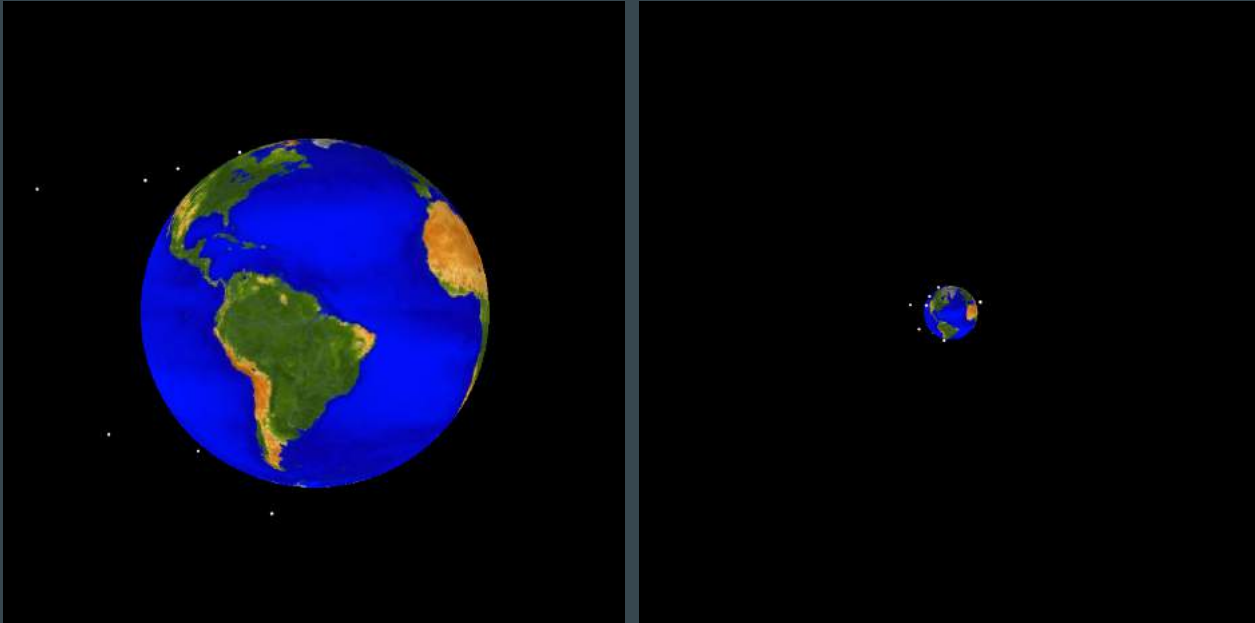
Before 1957



White dots represent catalogued objects (>10 cm in diameter)

# THE ISSUES: ORBITAL CONGESTION

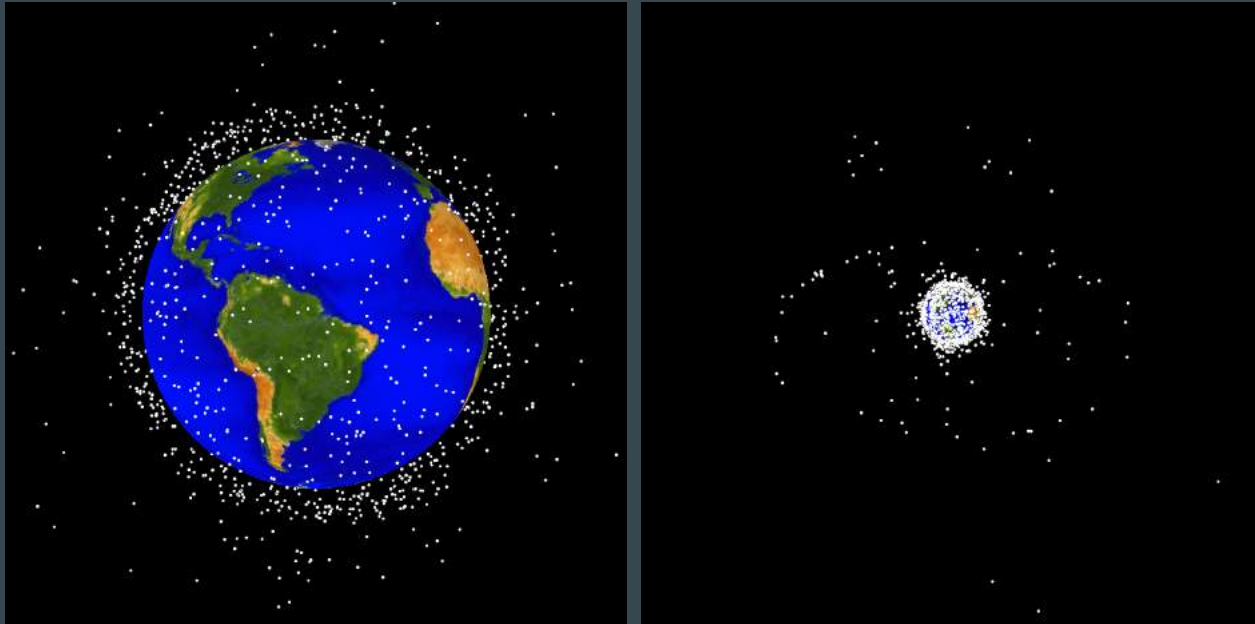
1960



White dots represent catalogued objects (>10 cm in diameter)

# THE ISSUES: ORBITAL CONGESTION

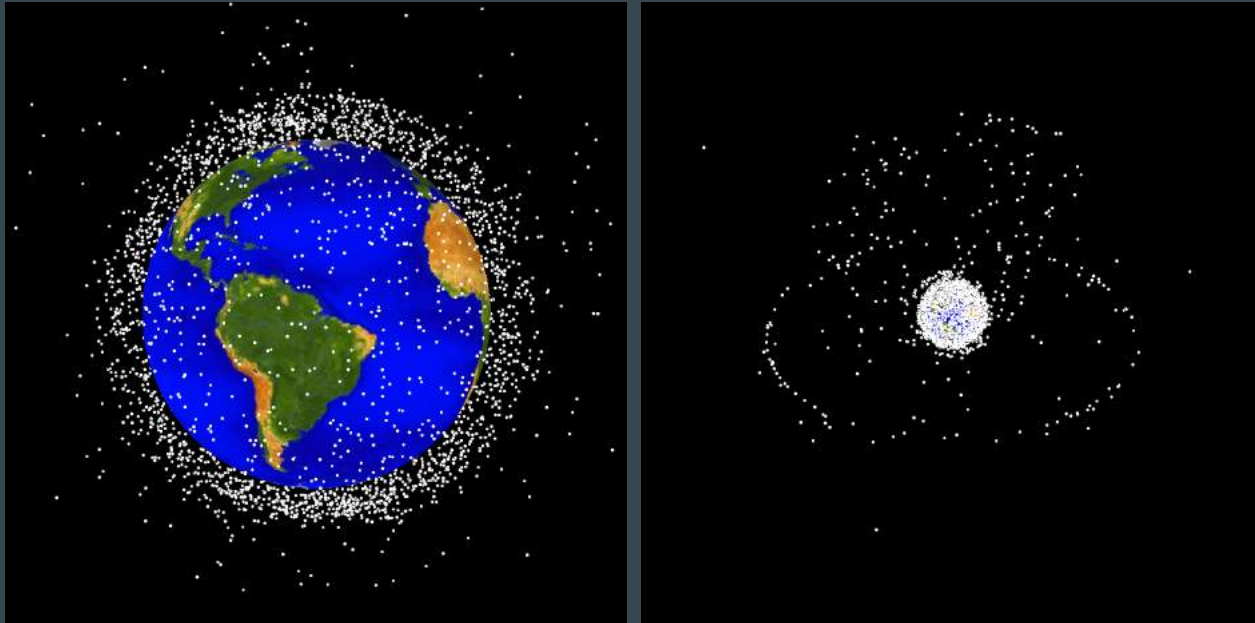
1970



White dots represent catalogued objects (>10 cm in diameter)

# THE ISSUES: ORBITAL CONGESTION

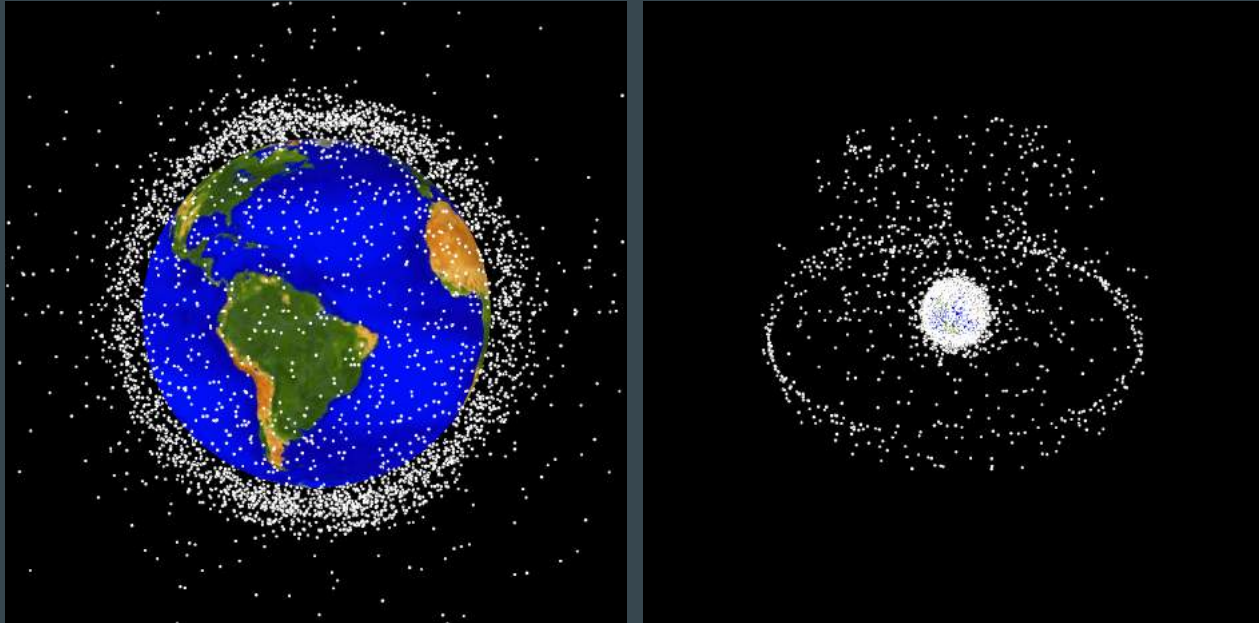
1980



White dots represent catalogued objects (>10 cm in diameter)

# THE ISSUES: ORBITAL CONGESTION

1990

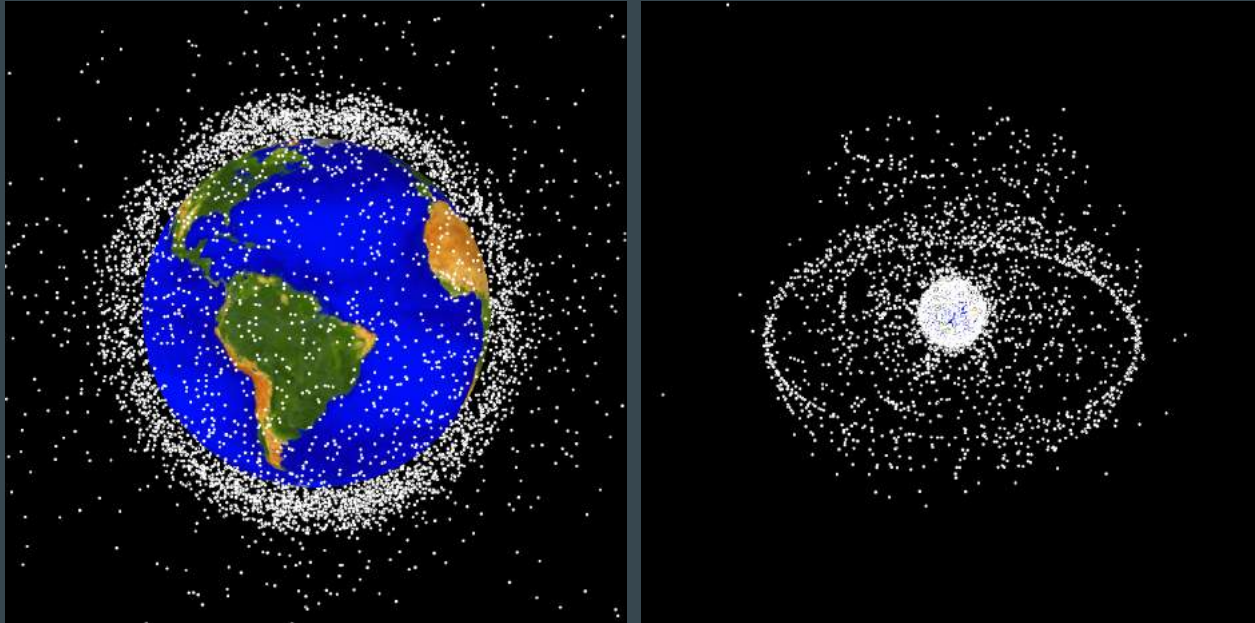


White dots represent catalogued objects (>10 cm in diameter)



# THE ISSUES: ORBITAL CONGESTION

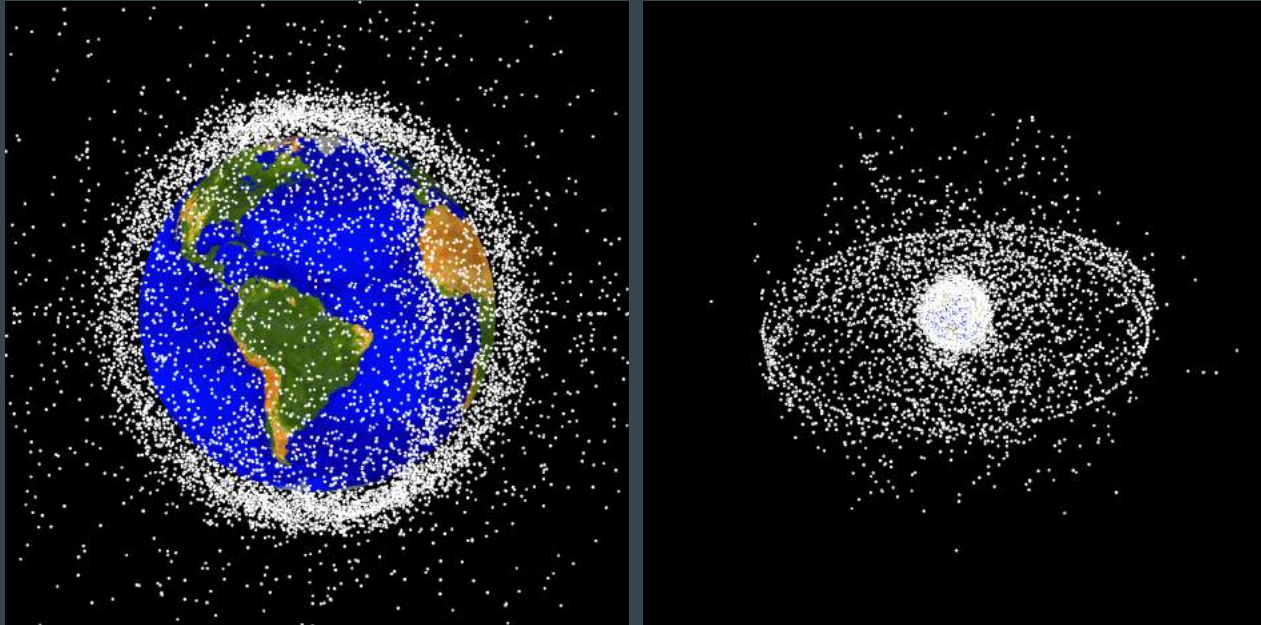
2000



White dots represent catalogued objects (>10 cm in diameter)

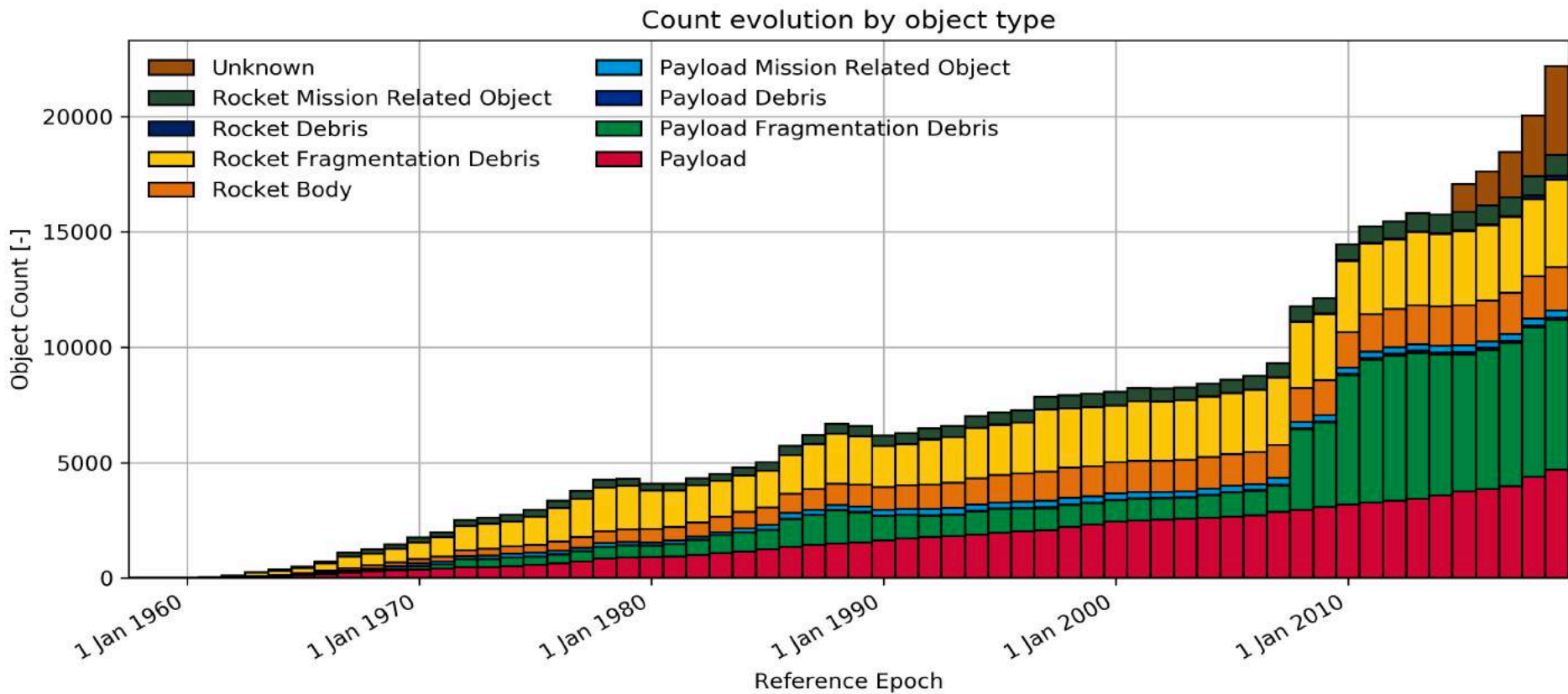
# THE ISSUES: ORBITAL CONGESTION

2010



White dots represent catalogued objects (>10 cm in diameter)

# THE ISSUES: ORBITAL CONGESTION



# THE ISSUES: SPACE IS BECOMING MORE GLOBAL

1966



Source: Union of Concerned Scientists



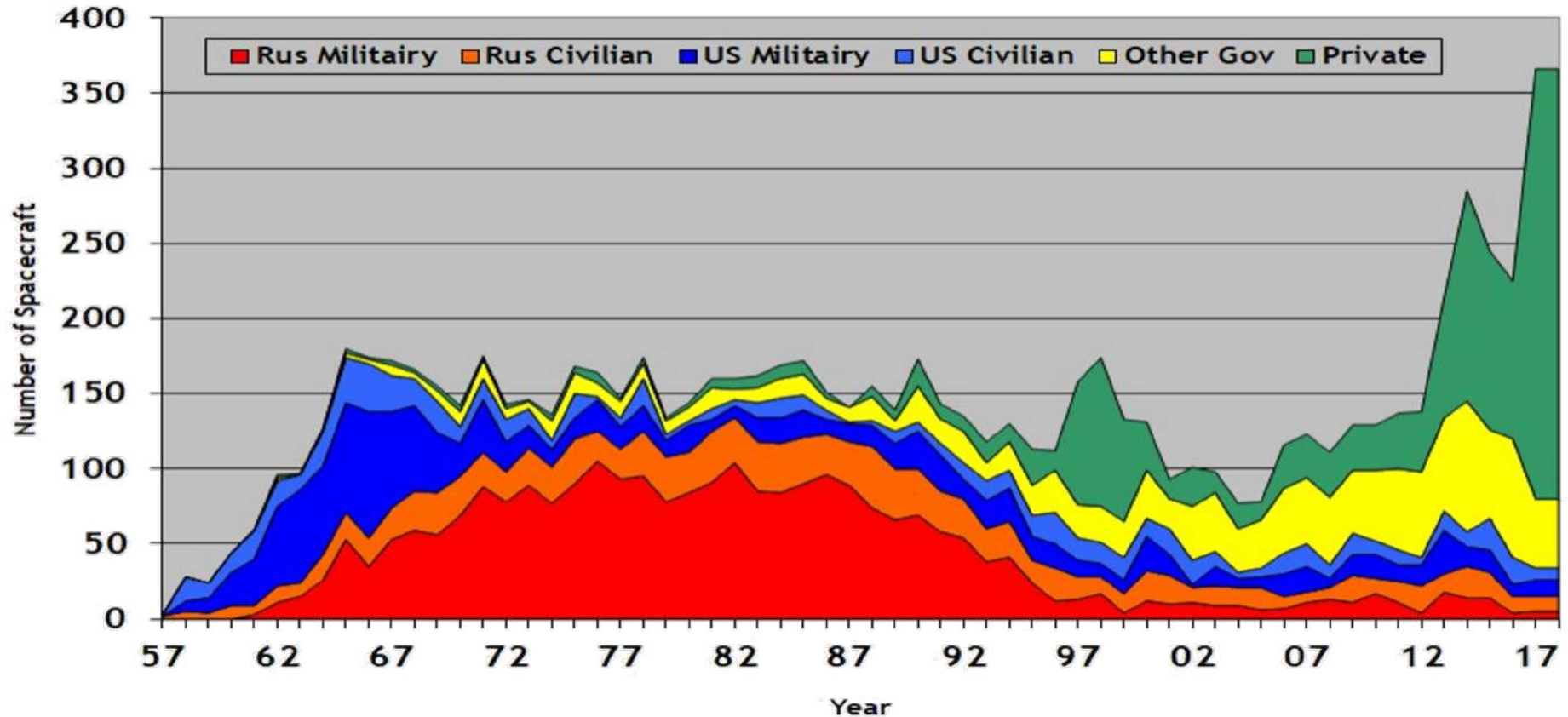
# THE ISSUES: SPACE IS BECOMING MORE GLOBAL



# THE ISSUES: SPACE IS BECOMING MORE GLOBAL

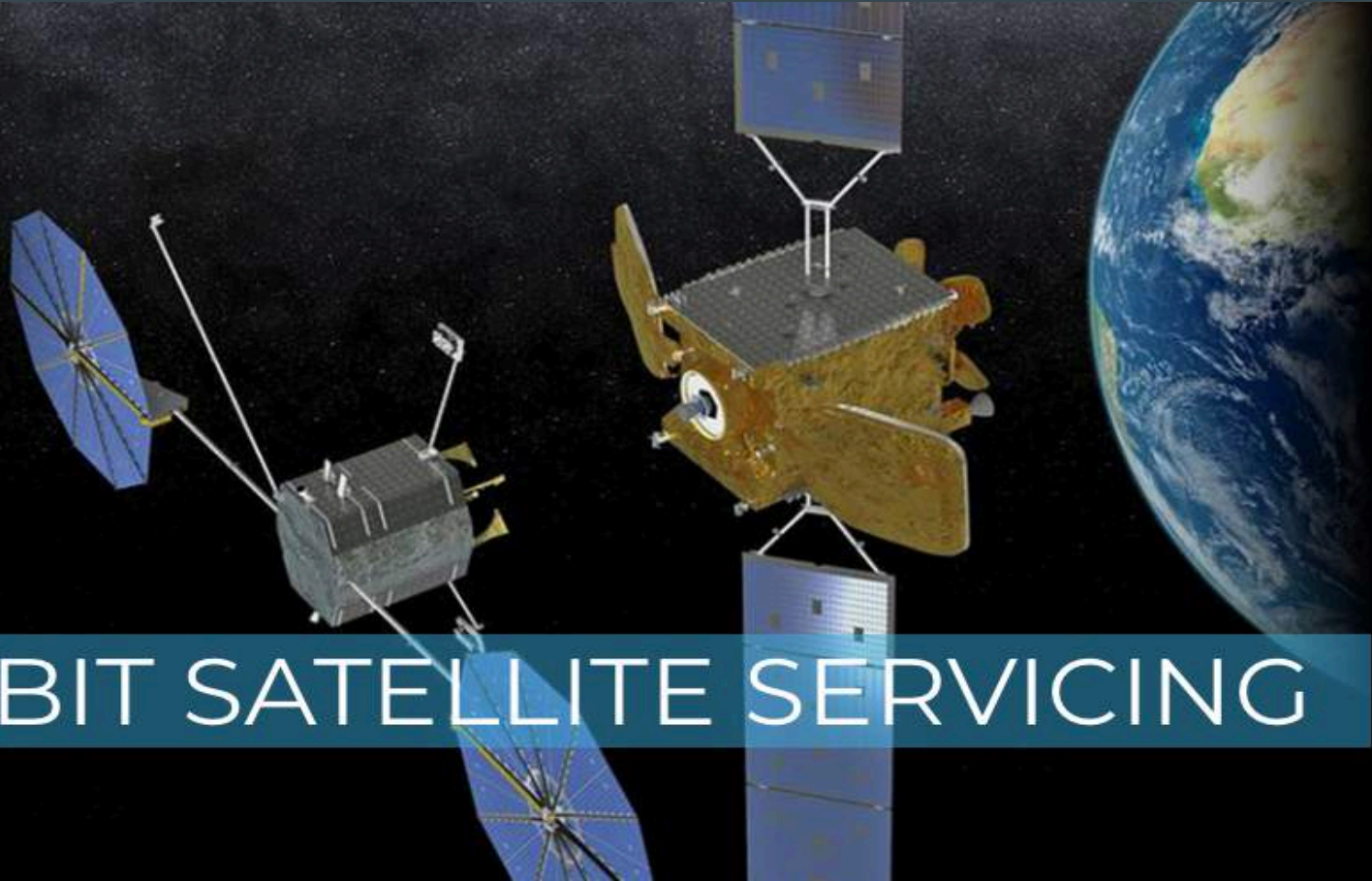


# THE ISSUES: NEW KINDS OF ACTORS





# THE ISSUES: **NEW KINDS OF SPACE ACTIVITIES**



ON-ORBIT SATELLITE SERVICING





# THE ISSUES: MEGA-CONSTELLATIONS

SPACENEWS

## LEO & MEO Broadband Constellations

At least 15 companies have declared their intent to develop broadband satellite constellations in low Earth orbit (LEO) or medium Earth orbit (MEO), according to Northern Sky Research. Most of these companies intend to have their first-generation systems deployed within five years. O3b, which is nearing completion of a 20-satellite constellation begun in 2013, will add seven mPower second-generation broadband satellites starting in 2021.

### PROGRESS KEY

-  Constellation builder selected
-  Launcher(s) identified
-  Prototype satellite(s) launched
-  Operational satellite(s) in orbit

Source: Northern Sky Research



# THE ISSUES: COUNTERSPACE THREATS



# THE ISSUES: SPACE WEATHER



# SECURE WORLD FOUNDATION TEAM



# SWF INFORMS



# SWF FACILITATES



# SWF STIMULATES





# SWF PROMOTES



# SWF PROGRAMS

SPACE SUSTAINABILITY

INTERNATIONAL  
GUIDELINES



STANDARDS FOR  
PROXIMITY OPS



RESPONSIBLE SPACE  
OPERATIONS



RESPONSIBLE SPACE  
INVESTMENT



Whether supporting **dialogues on space security**, or promoting the **development of norms for responsible behavior** among private sector space actors, or the supporting **capacity-building** efforts of the UN, the professional program managers at SWF are focused on achieving our vision of the secure, sustainable, and peaceful uses of outer space, benefiting Earth and all its peoples.

# SWF PROGRAMS

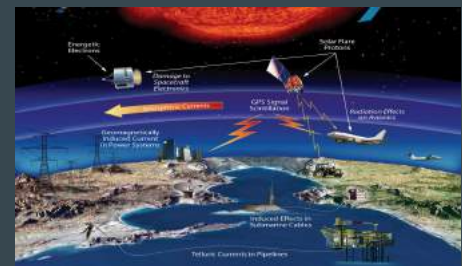
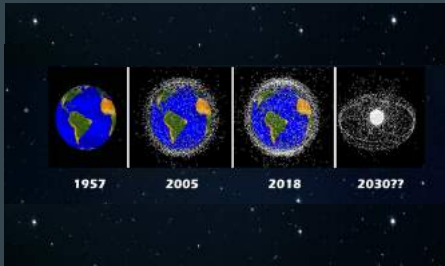
## SPACE SAFETY & SECURITY

SPACE SITUATIONAL  
AWARENESS

SPACE SECURITY

COUNTERSPACE

SPACE WEATHER



Whether supporting **dialogues on space security**, or promoting the **development of norms for responsible behavior** among private sector space actors, or the supporting **capacity-building** efforts of the UN, the professional program managers at SWF are focused on achieving our vision of the secure, sustainable, and peaceful uses of outer space, benefiting Earth and all its peoples.

# SWF PROGRAMS

## RULE OF LAW

SPACE RESOURCE  
GOVERNANCE

INTERNATIONAL  
SPACE LAW

COOPERATIVE  
GOVERNANCE

LAWS OF CONFLICT  
APPLIED IN SPACE



Whether supporting **dialogues on space security**, or promoting the **development of norms for responsible behavior** among private sector space actors, or the supporting **capacity-building** efforts of the UN, the professional program managers at SWF are focused on achieving our vision of the secure, sustainable, and peaceful uses of outer space, benefiting Earth and all its peoples.

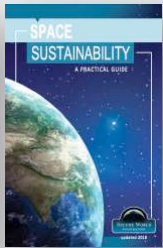
# SWF PROGRAMS

NEW SPACE ACTORS

CAPACITY BUILDING

NEXT GENERATION

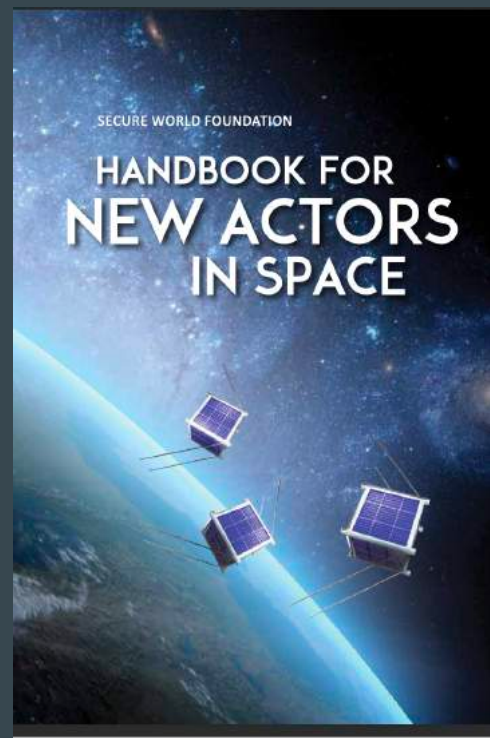
HUMAN &  
ENVIRONMENTAL  
SECURITY



Whether supporting **dialogues on space security**, or promoting the **development of norms for responsible behavior** among private sector space actors, or the supporting **capacity-building** efforts of the UN, the professional program managers at SWF are focused on achieving our vision of the secure, sustainable, and peaceful uses of outer space, benefiting Earth and all its peoples.

# Manual Para Nuevos Actores En El Espacio

- **Goal:** Create a publication that provides an overview of fundamental principles, laws, norms, and best practices for safe, predictable, and responsible activities in space.
- **Two specific audiences:**
  - Countries developing space programs and/or having to oversee and regulate their first satellites
  - Universities and start-up companies that are developing/operating satellites



# Chapter 1 – International Framework

- Freedom and Responsibility
- Registration of Space Objects
- International Frequency Management
- Remote Sensing
- International Standards
- International Export Control
- International Liability
- Dispute Settlement
- Environmental Issues
- Advanced Issues
- International Organizations

## UNOOSA International Registry Form

Part A: Information provided in conformity with the Registration Convention or General Assembly Resolution 1721 B (XVI)		
New registration of space object	Yes <input type="checkbox"/>	Check Box
Additional information for previously registered space object	Submitted under the Convention: ST/SG/SER.E/ <input type="checkbox"/>	UN document number in which previous registration data was distributed to Member States
	Submitted under resolution 1721B: A/AC.105/INF. <input type="checkbox"/>	
Launching State/States/International intergovernmental organization		
State of registry or international intergovernmental organization	<input type="text"/>	Under the Registration Convention, only one State of registry can exist for a space object.
Other launching States	<input type="text"/>	
Designator		
Name	<input type="text"/>	
COSPAR international designator	<input type="text"/>	
National designator/registration number as used by State of registry	<input type="text"/>	
Date and territory or location of launch		
Date of launch (hours, minutes, seconds optional)	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	Coordinated Universal Time (UTC)
Territory or location of launch	<input type="text"/>	
Basic orbital parameters		
Nodal period	<input type="text"/>	minutes
Inclination	<input type="text"/>	degrees
Apogee	<input type="text"/>	kilometres
Perigee	<input type="text"/>	kilometres

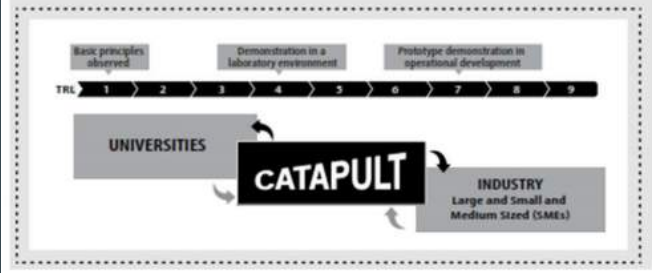
# Chapter 2 – National Policy & Administration

- Public Policy
  - Rationales, objectives, principles
  - Government roles and responsibilities
  - Government and the private sector
  - +++
- Public Administration and National Oversight
  - National regulators and licensing
  - National frequency administration
  - Export controls
  - +++
- Case Studies:
  - Remote Sensing Policy and Administration

## Case Study:

### The United Kingdom Satellite Applications Catapult

The United Kingdom Satellite Applications Catapult was established by the government of the United Kingdom (UK) in May 2013 with the goal of creating economic growth in the UK through supporting the development, commercialization, and use of satellite applications. According to its Delivery Plan 2015–2020, the Catapult (Figure 8) aims to promote satellite application and technology development and to help domestic industry “bring new products and services more rapidly to market.” The Satellite Applications Catapult is one of 11 “Catapults” operating in the UK, each focusing on different technologies and application areas. The Catapult operates as a private, not-for-profit research organization. It is governed by a board, which includes representation from the United Kingdom Space Agency (UKSA) and from Innovate UK—a government agency focused on fostering technology and economic development.





# Chapter 3 – Responsible Space Operations

- Pre-launch
  - Licensing
  - Launch vehicle selection and integration
  - Insurance
- Launch
  - Safety considerations
- On-orbit
  - Orbit determination, propagation, and tracking
  - Conjunction assessment and collision avoidance
  - Anomaly response
- End-of-life

Examples of CA Screening Volumes					
Orbit Regime	Orbit Regime Criteria/Definition	Predict/ Propagate/ Time	Radial Miss (km)	In-Track Miss (km)	Cross-Track Miss (km)
GEO	1300min < Period < 1800 min Eccentricity < 0.25 & Inclination < 35°	10 days	12	364	30
HEO 1	Perigee < 2000 km & Eccentricity > 0.25	10 days	40	77	107
MEO	600 min < Period < 800 min Eccentricity < 0.25	10 days	2.2	17	21
LEO 4	1200 km < Perigee ≤ 2000 km Eccentricity < 0.25	7 days	0.5	2	2
LEO 3	750 km < Perigee ≤ 1200 km Eccentricity < 0.25	7 days	0.5	12	10
LEO 2	500 km < Perigee ≤ 750 km Eccentricity < 0.25	7 days	0.5	28	29
LEO 1	Perigee ≤ 500 km Eccentricity < 0.25	7 days	2	44	51

Examples of close approach screening volumes

# Handbook Next Steps

- The Handbook was officially released in February 2017
- The Spanish-language edition was officially released in February 2020
- Electronic copies are available through the SWF website, free of charge: [www.swfound.org/handbook](http://www.swfound.org/handbook)
- Feedback is welcome!
- New Actors in the Space Domain: Latin America and the Caribbean
  - June 12, 2020; 11:00 am EDT
  - Featuring speakers from NASA, the Mexican Space Agency, and Universidad del Valle de Guatemala.



*For more information and scheduling please contact*

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Secure World Foundation

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