



Promoting Cooperative Solutions for Space Sustainability

How Do I Ask Permission to Engage With A Piece of Space Debris?

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Our previous engagement...

- My 2012 Workshop presentation raised the following issues that needed to be addressed:
 - What is “space debris”?
 - Which space objects should be removed?
 - Who is allowed to remove a particular object?
 - Who has the “reference satellite catalog”?
 - Is that an ASAT weapon?
 - IP and ITAR
- **Key issue:** How do we know who “owns” an object we’re trying to remove so we can ask permission?
- **Goal of my talk:** figure out a way through the current uncertainty so we can move forward

What is a “space object”?

- Registration Convention, Article I
 - The term “space object” includes *component parts of a space object* as well as its *launch vehicle and parts thereof*
- **Problem 1:** Is the object I am going to interact with a space object in a legal context?
 - Artificial satellites, rocket bodies -> *absolutely yes*
 - Piece of a solar panel, lens cap, boom fragment, nozzle -> *absolutely yes*
 - Tiny piece of Mylar, paint fleck, NaK droplet -> *most lawyers would say yes but it is debatable*

**Assumption: our piece of debris is a space object
and thus the treaties apply**

Do I need to ask permission?

- OST Article VIII: A State Party to the Treaty *on whose registry an object launched into outer space is carried shall retain jurisdiction and control* over such object
- **Problem 2:** What do these terms actually mean in a legal context?
 - Jurisdiction: *legal* power (right & ability of a State to make/enforce laws)
 - Control: *operational* power (does this apply for space debris?)
 - This is *not* the same as national sovereignty (ie, flagged ships)
 - The existing space treaties explicitly avoided establishing national sovereignty over space objects

Assumption: there are one or more States out there that we next to ask permission from

Who do I ask permission from?

- Liability Convention, Article I
 - The term “launching State” means:
 - A State which **launches or procures** the launching of a space object;
 - A State from whose **territory or facility** a space object is launched
- Registration Convention, Article I
 - Article I: The term “State of registry” means a **launching State on whose registry a space object is carried**
 - Article II: After launch, the launching State shall register the space object by means of an entry in an appropriate **registry which it shall maintain & inform the UN**
- Launching State -> liability, State of Registry -> jurisdiction and control

Assumption: Need to ask permission from the State of Registry for this space object

UN compilation of State notifications

Convention on Registration of Objects Launched into Outer Space

Notifications from States & Organizations

The following States and Organizations have provided the United Nations with information regarding objects launched into outer space in accordance with the [Registration Convention](#) and/or General Assembly [resolution 1721 B \(XVI\)](#). Click on links to go to an index of online documents for that particular State or Organization.

For an index of notifications by Member States and Organizations on the establishment of National Registers of Objects Launched into Outer Space, please click [here](#).

- [Algeria](#)
- [Argentina](#)
- [Australia](#)
- [Austria](#)
- [Brazil](#)
- [Canada](#)
- [Chile](#)
- [China](#)
- [Czech Republic \(includes information from Czechoslovakia\)](#)
- [Democratic People's Republic of Korea](#)
- [Denmark](#)
- [Egypt](#)
- [European Space Agency \(ESA\)](#)
- [European Organisation for the Exploitation of Meteorological Satellites \(EUMETSAT\)](#)
- [France](#)
- [Germany \(includes information from the Federal Republic of Germany\)](#)
- [Greece](#)
- [Hungary](#)
- [India](#)
- [Israel](#)
- [Italy](#)
- [Japan](#)

Example of a State notification to the UN

Registration data on a space object launched by Algeria*

ALSAT-2A

Information provided in conformity with the Convention on Registration of Objects Launched into Outer Space

Committee on Space Research international designator:	2010-035D
Name of space object:	ALSAT-2A
State of registry:	Algeria
Other launching States:	Algeria
Date and territory or location of launch	
Date of launch:	12 July 2010 03 hrs 52 min UTC
Territory or location of launch:	Satish Dhawan Space Centre, Sriharikota, India
Basic orbital parameters	
Nodal period:	98.33 minutes
Inclination:	98.228 degrees
Apogee:	687.8 kilometres
Perigee:	670.5 kilometres
General function of space object:	Earth observation satellite equipped with a camera with a spatial resolution of: 2.5 m in panchromatic mode; and 10 m in multispectral mode.

Can you *positively* correlate this info to an observed object?

How many “space objects” are there?

Search Results

Important Note: Information in square brackets ([and]) and highlighted in green has been obtained from other sources and has not been communicated officially to the United Nations. Reference to external websites does not imply endorsement by the United Nations Office for Outer Space Affairs (UNOOSA) of their contents. The views expressed are those of the authors and do not necessarily reflect the policies or views of UNOOSA. The hyperlinks are provided solely for informational purposes.

Criteria:

UN Registered:'Yes'

Presently in Space:'Yes'

Result:

3529 Objects found. Displaying 20 per page.

So there are only 3,529 space objects, right?

0-20 of 3529»»

International Designator	Name of Space Object	State/Organization	Date of Launch	GSO Location	Nuclear Power Source	UN Registered	Document of Registration	Status	Date of Decay or Change	Document of Decay or Change	Function of Space Object	Remarks	External Web Site
1958-BETA 2	[VANGU 1]												LINK
1959-ALPHA 1	[VANGU 2]												
1959-ETA 1	[VANGU 3]												
1959-IOTA 1	[EXPLORE (S-1A)]												
[1959-MU 1]	First space rocket [LUNA 1]												
1959-NU 1	[PIONEER]												LINK
1960-ALPHA 1	[PIONEER]												
1960-BETA 2	[TIROS 1]												LINK
1960-ETA 1	[TRANSIT 2A]												

COUNTRY TOTALS:

Show 10

Not according to USSTRATCOM

	IN ORBIT				
COUNTRY	UNASSIGNED	PAYLOAD	ROCKET BODY	DEBRIS	TOTAL
VIETNAM (VTNM)	0	3	0	0	3
ALL (ALL)	1	3913	1992	10991	16897

Showing 81 to 82 of 82 entries

Various sources on # of space objects

Source	Number	Notes
UN Satellite Registry	3,529*	Compiled from national notifications to the UN
Space-Track.org Catalog	16,897*	Actively tracked and associated with a launch, bigger than 10cm
USSTRATCOM private database	~23,000	Includes catalog plus ~6,000 objects tracked but not associated with a launch
Space debris research community	~500,000	Total objects bigger than 1cm

* As of 1 June 2014

** As of 27 Feb 2014

Who has the “authoritative” catalog?

A DRAFT PROTOCOL FOR ASKING PERMISSION

A proposed way forward

- Need to develop a protocol for how an entity conducting remediation can request permission from the State of Registry, including for objects *where it is unclear who that may be*
- Methodology
 - Work from principles in the existing UN treaties
 - Assume that a State is providing supervision and oversight of the remediation activity
 - If it's a private sector actor doing it, they are operating under a license from some State
 - Assume that we're going after a specific space object

Some principles to guide us

- Outer Space Treaty
 - States...shall be guided by the principle of cooperation and mutual assistance and shall conduct all their activities in outer space ***with due regard*** to the corresponding interests of all other States Parties
 - If a State will undertake actions that may cause harmful interference it ***shall undertake appropriate international consultations before proceeding...and may request consultation***
 - To promote cooperation, States agree to ***inform*** the Secretary-General of the United Nations as well as the public and the international scientific community, ***to the greatest extent feasible and practicable, of the nature, conduct, locations and results of such activities***
- Registration Convention
 - Where a State Party cannot identify a space object...which ***may be of a hazardous or deleterious nature***, other States Parties...possessing space monitoring and tracking facilities, ***shall respond to the greatest extent feasible to a request...for assistance***

1. Identify the object you wish to interact with
2. Consult the UNOOSA registry to see if another State has registered the object (if yes -> ask)
3. If no, then make request to States with tracking facilities for information/assistance in ID'ing the object
4. If still no resolution, then make a public announcement
 - a) Intent to interact with the object & how
 - b) Orbital parameters of the object, characterization
5. Wait for a specific time for any Launching State to come forward
 - a) If one does -> ask them.
 - b) If none -> proceed with plan

- One or more *international* technology demonstration missions are still crucial
 - Provide a *specific example* for the policy wonks and lawyers to discuss
 - Lay *technical, legal, and policy groundwork* for future remediation activities
 - Test the protocol
- Finding a legal basis for mass removal of small debris objects and/or automated, untargeted removal is going to be a challenge
 - Appears to be incompatible with the existing legal regime
 - May require establishing a version of maritime salvage law for space
 - Debris objects under a certain size are “fair game” for removal
- If a State has not registered an object, do they relinquish control?



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Questions/Comments?

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