



SPACE Blastoff! NASA's Artemis 1 moon rocket launches on historic first mission



Share



Watch on YouTube



Summary of the current satellite situation

Yiping Ren Linting Wang Tyler Christoforo Yuhan Wang
Yicheng Jiang | Ishan nagrani

Table of Contents

01
Dataset
description

02
Satellite
basics

03
Key findings & analysis

Data Description

UCS Satellite Database

5467

Rows

28

Columns

22

Categorical

6

Numerical

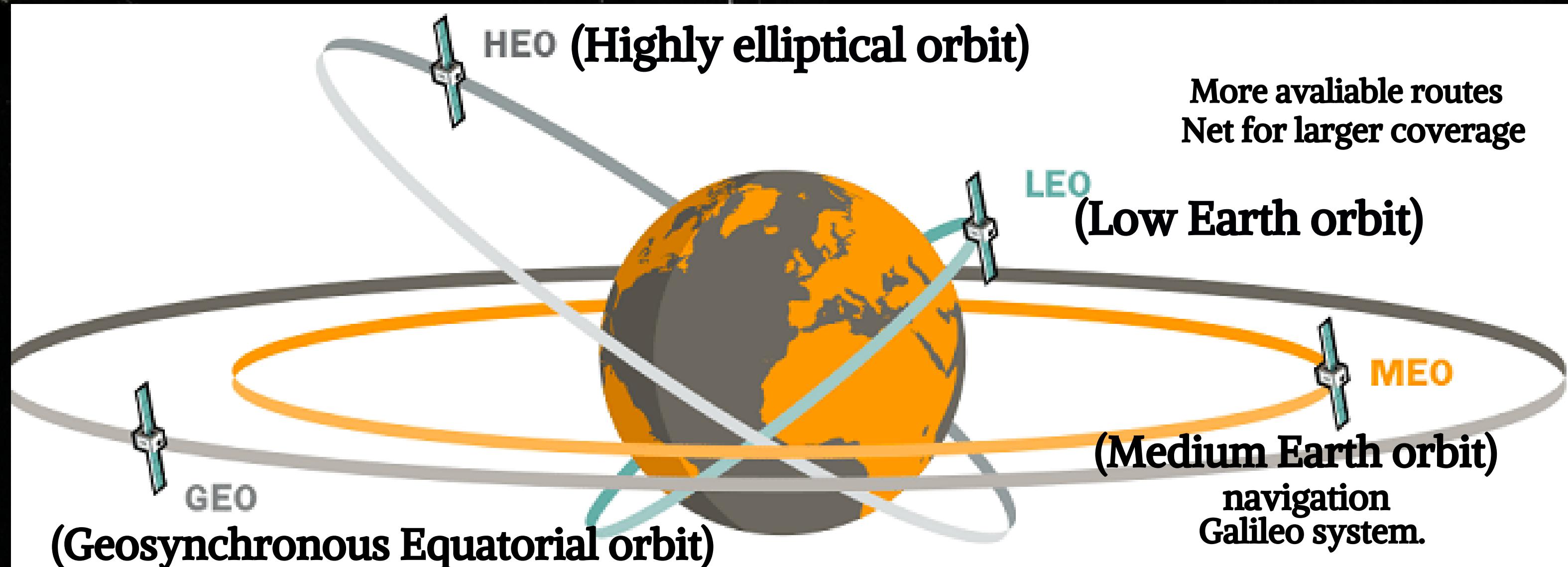
Data Cleaning

- Drop columns
 - Generalize multi-national satellites
- Date splice
- Multi-user cleaning

Government/Civil is the same as Civil/Government



Satellite basics

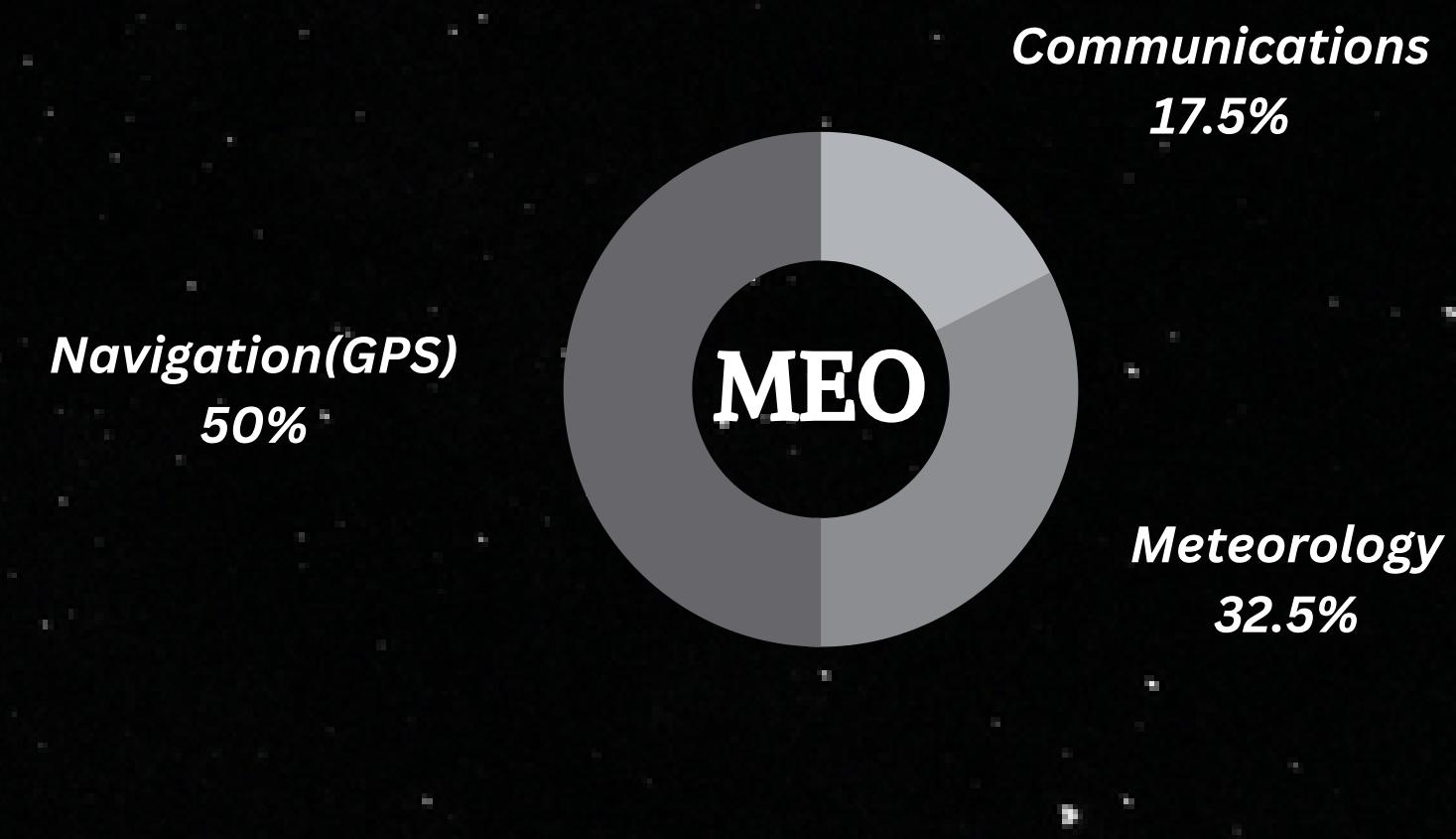
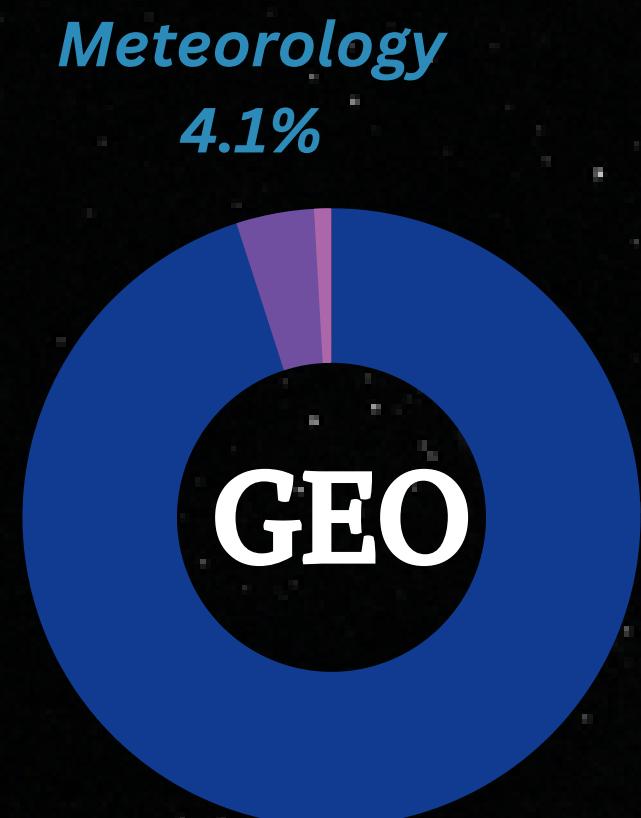
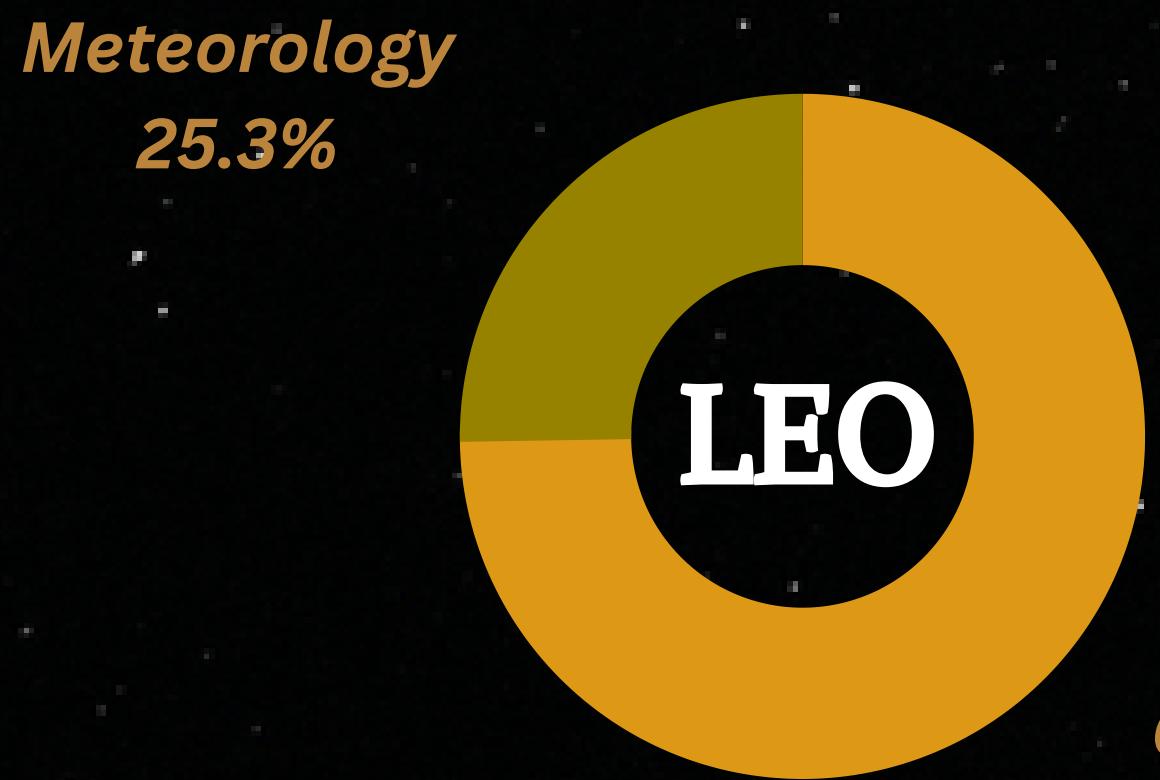
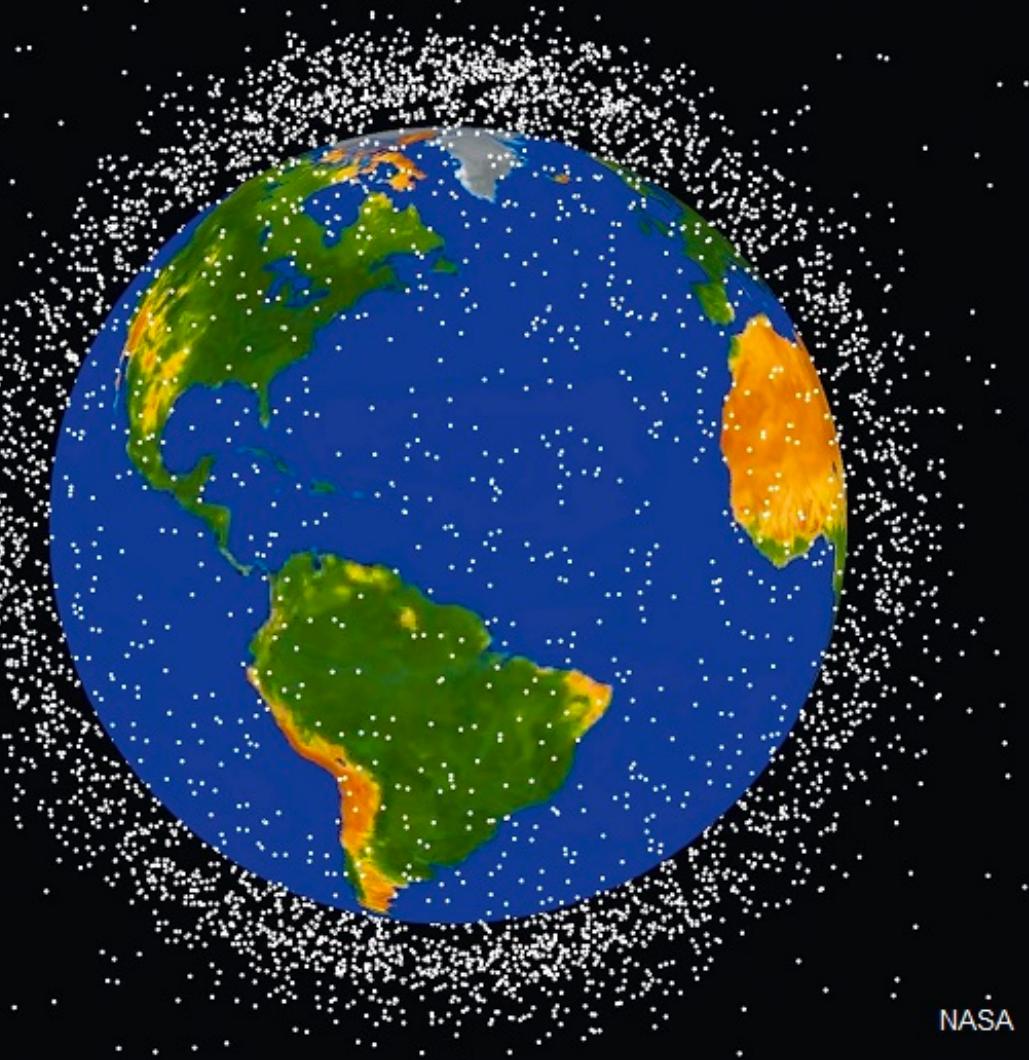
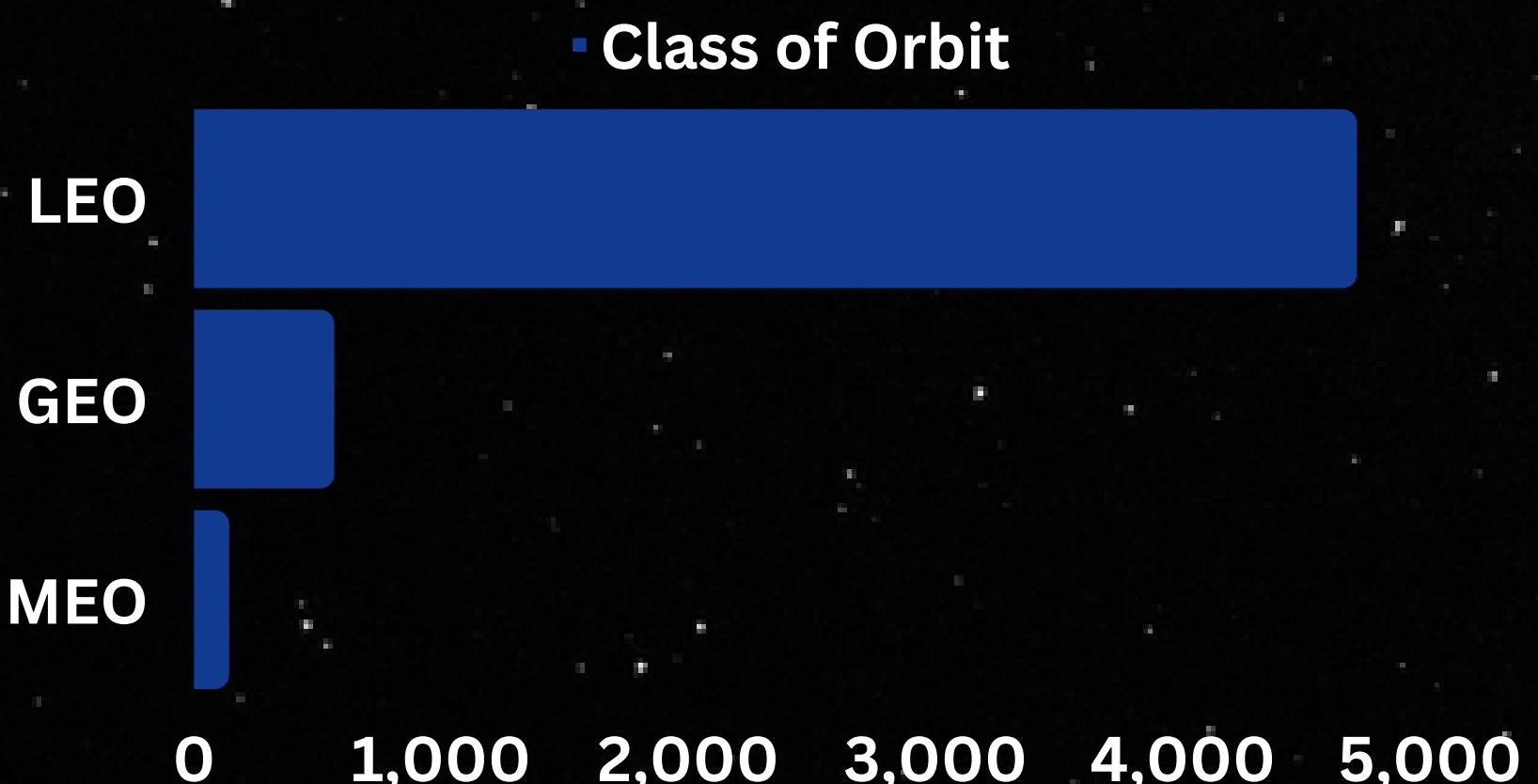


expensive & low mobility
telecommunication
weather monitoring
covers larger sections

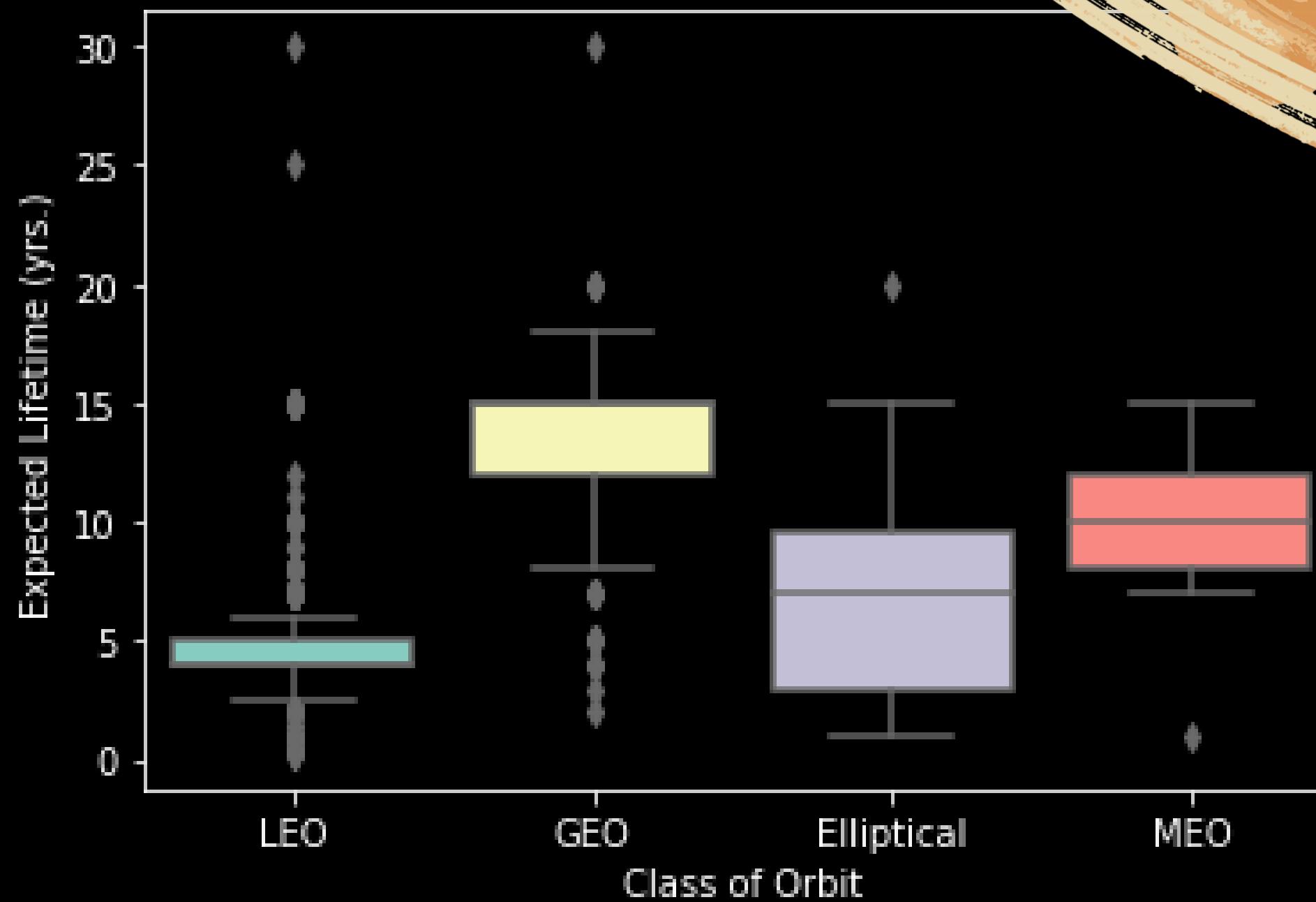
Key Findings & Analysis



Distribution for Earth Orbit

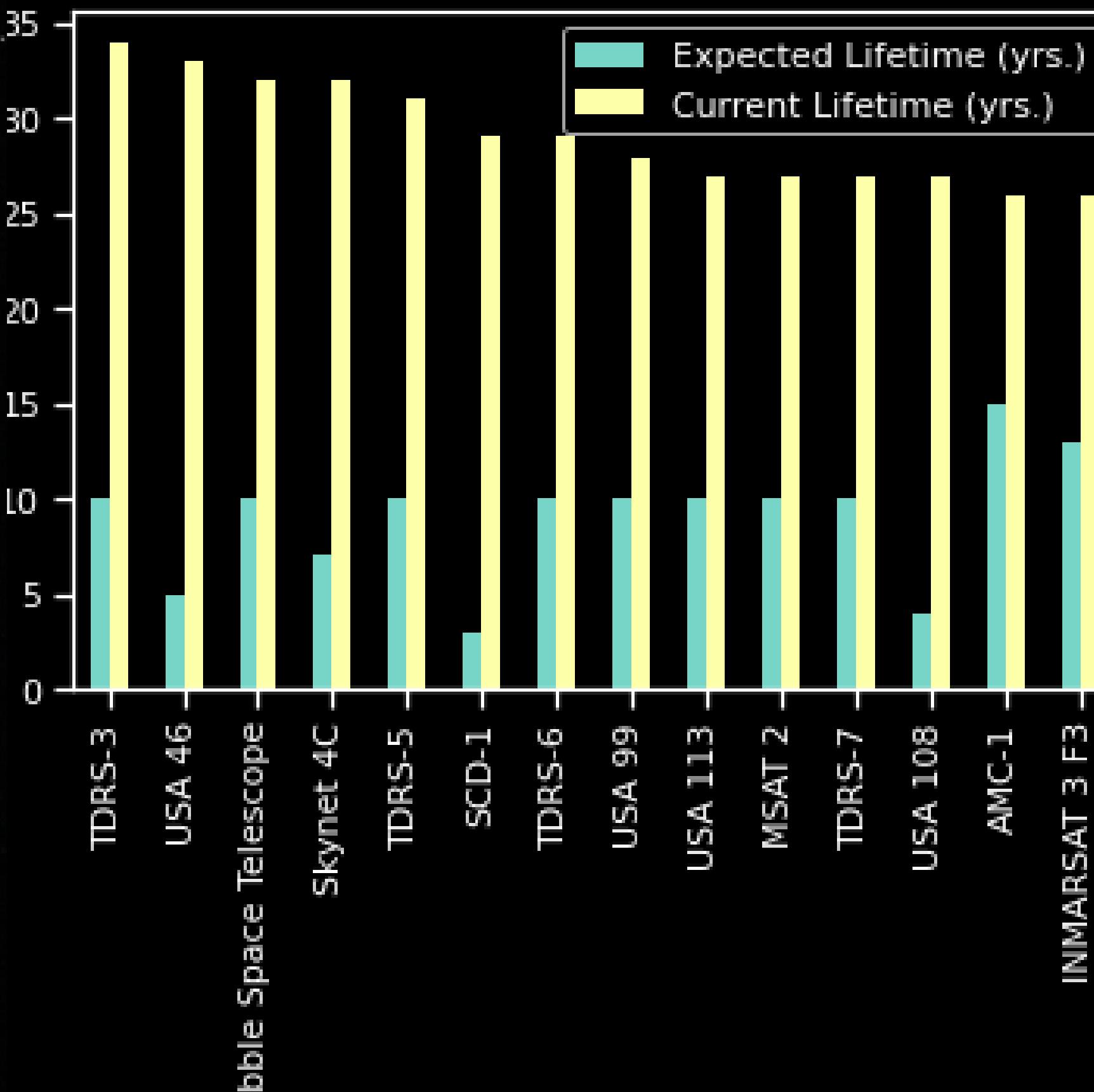


Expected lifetime



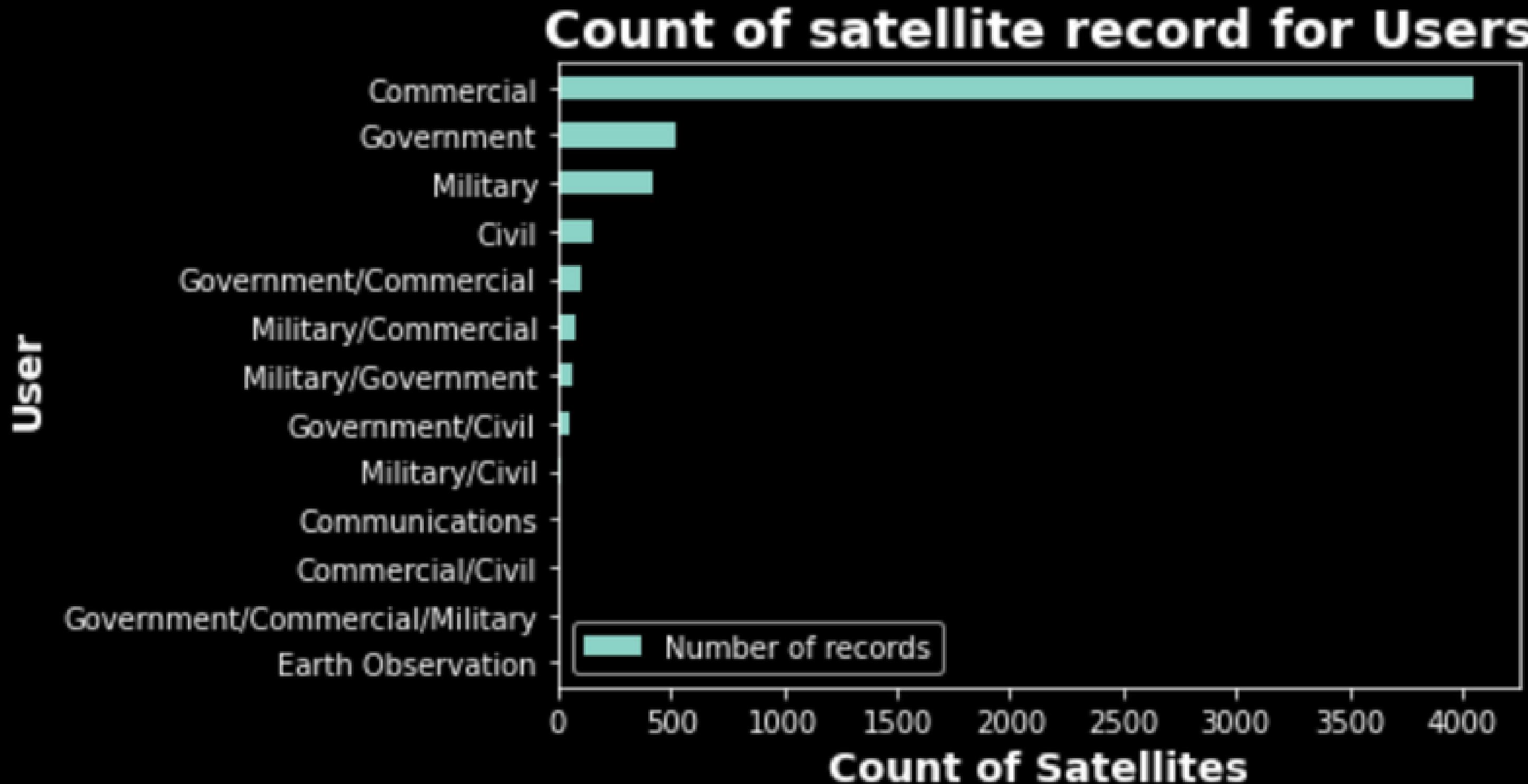
- GEO satellites have the longest expected lifetime
- LEO satellites have the shortest expected lifetime

Exceeding expected lifetime

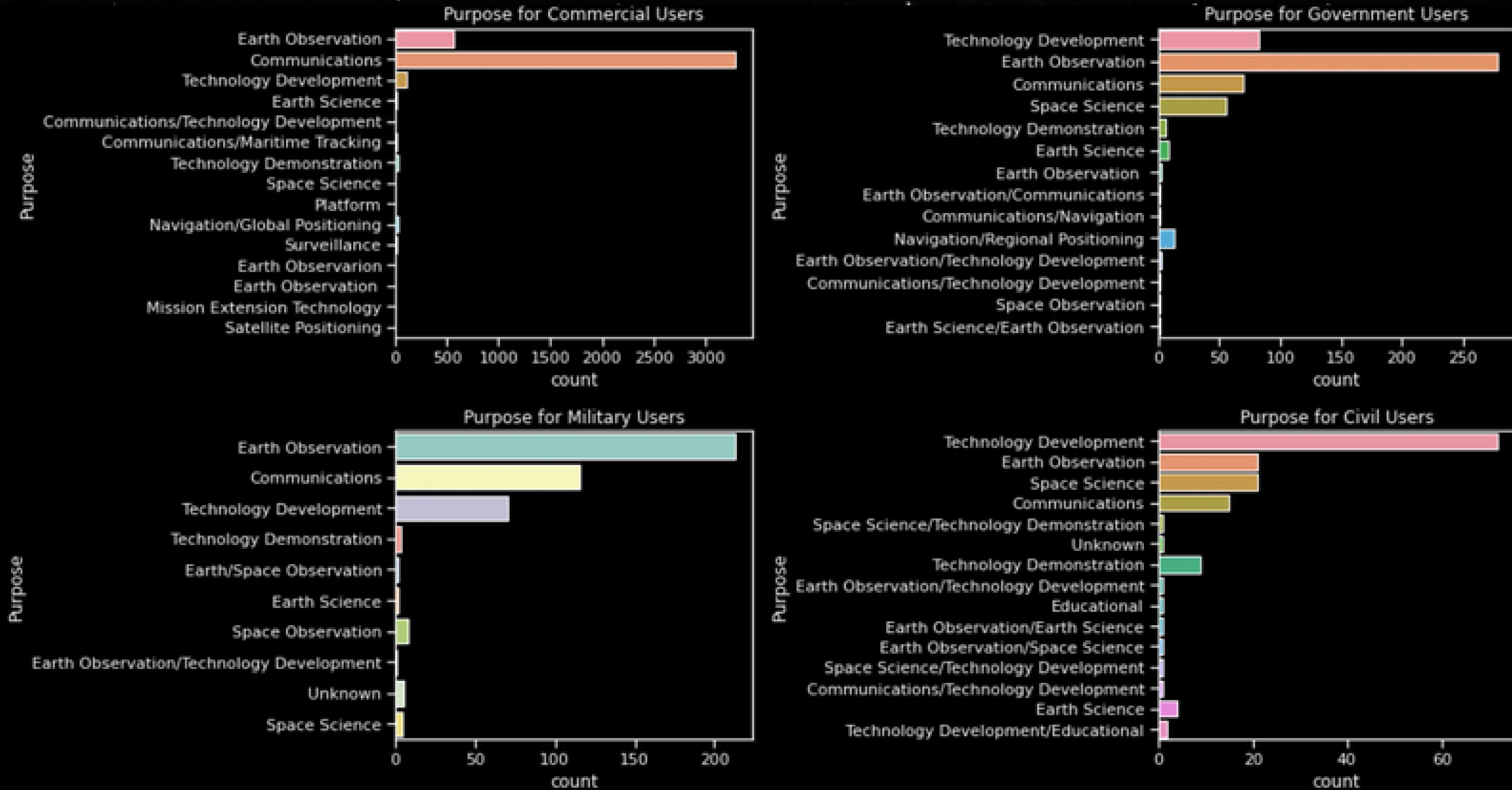


- 560 satellites have longer current life time than expected
- 14 satellites have current lifetime longer than 25 years

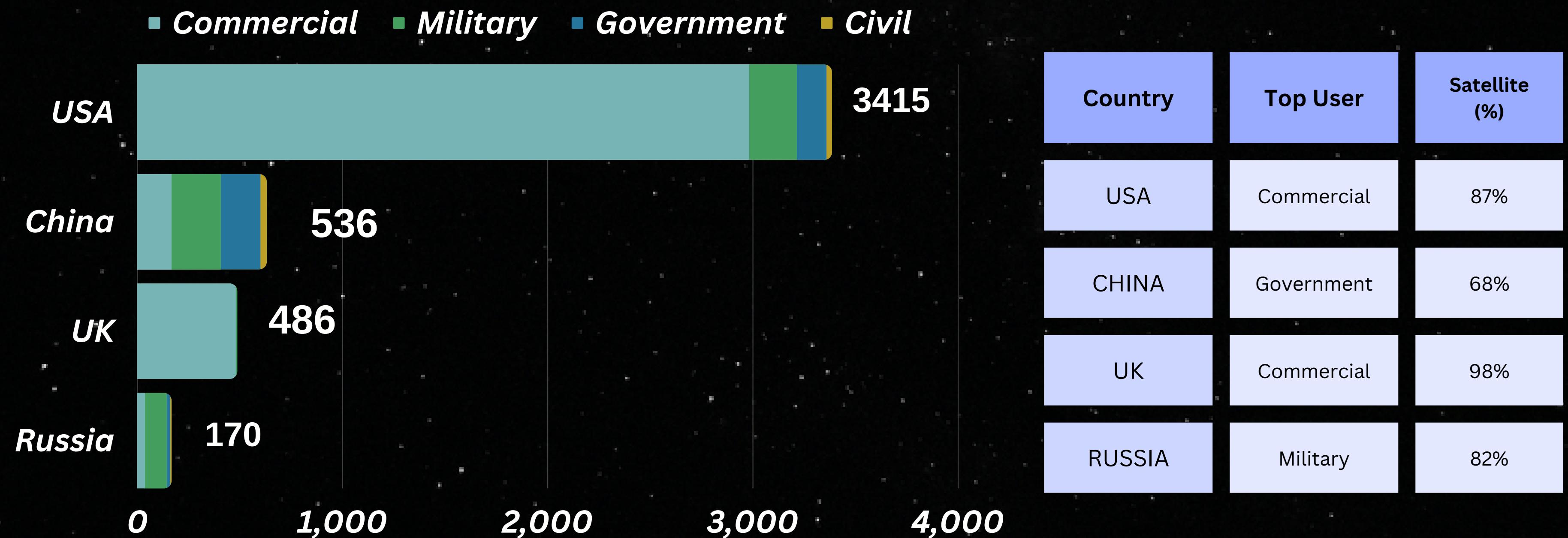
Distribution among users



Purpose for Satellite user type

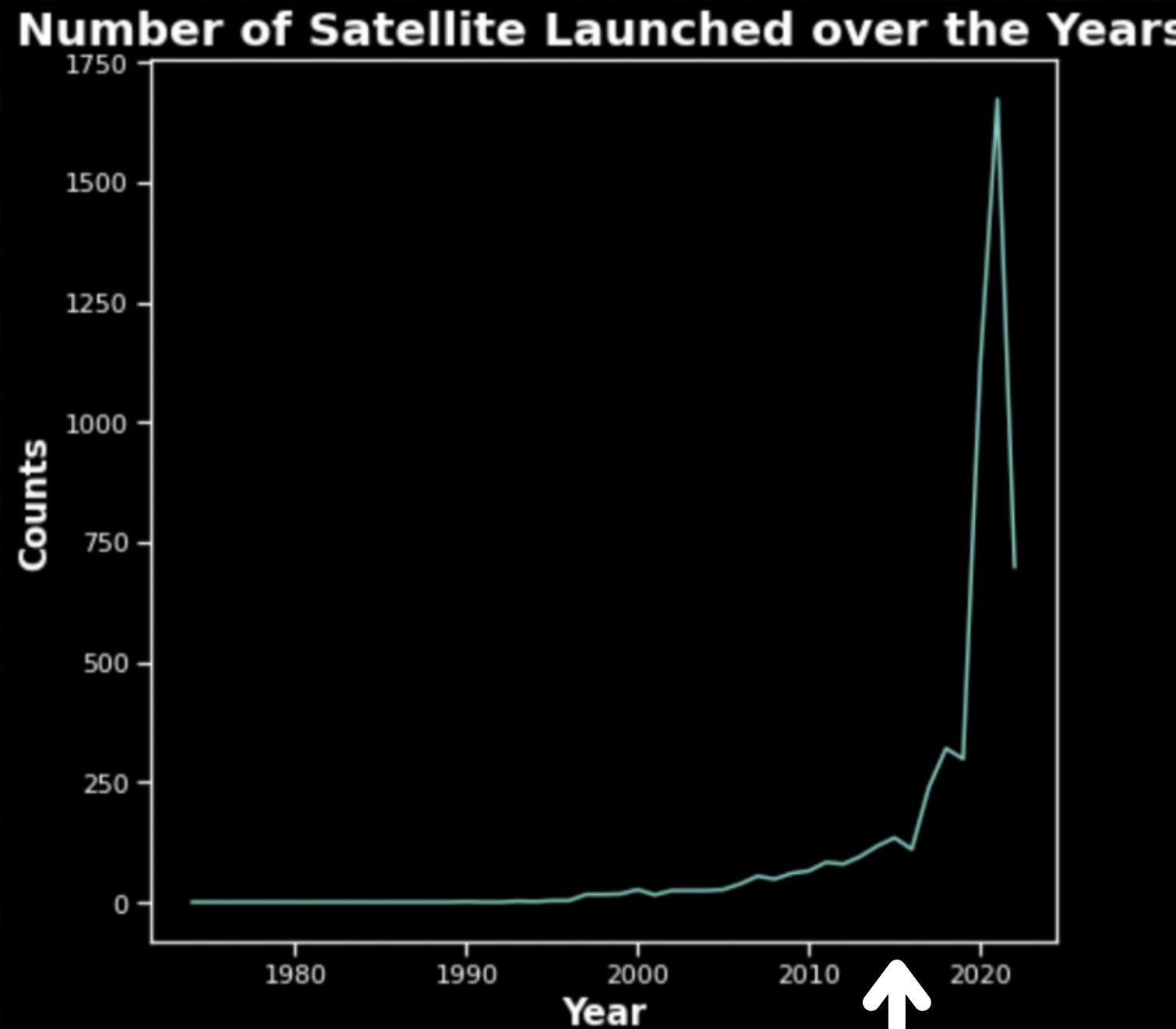


Satellite records by countries and User

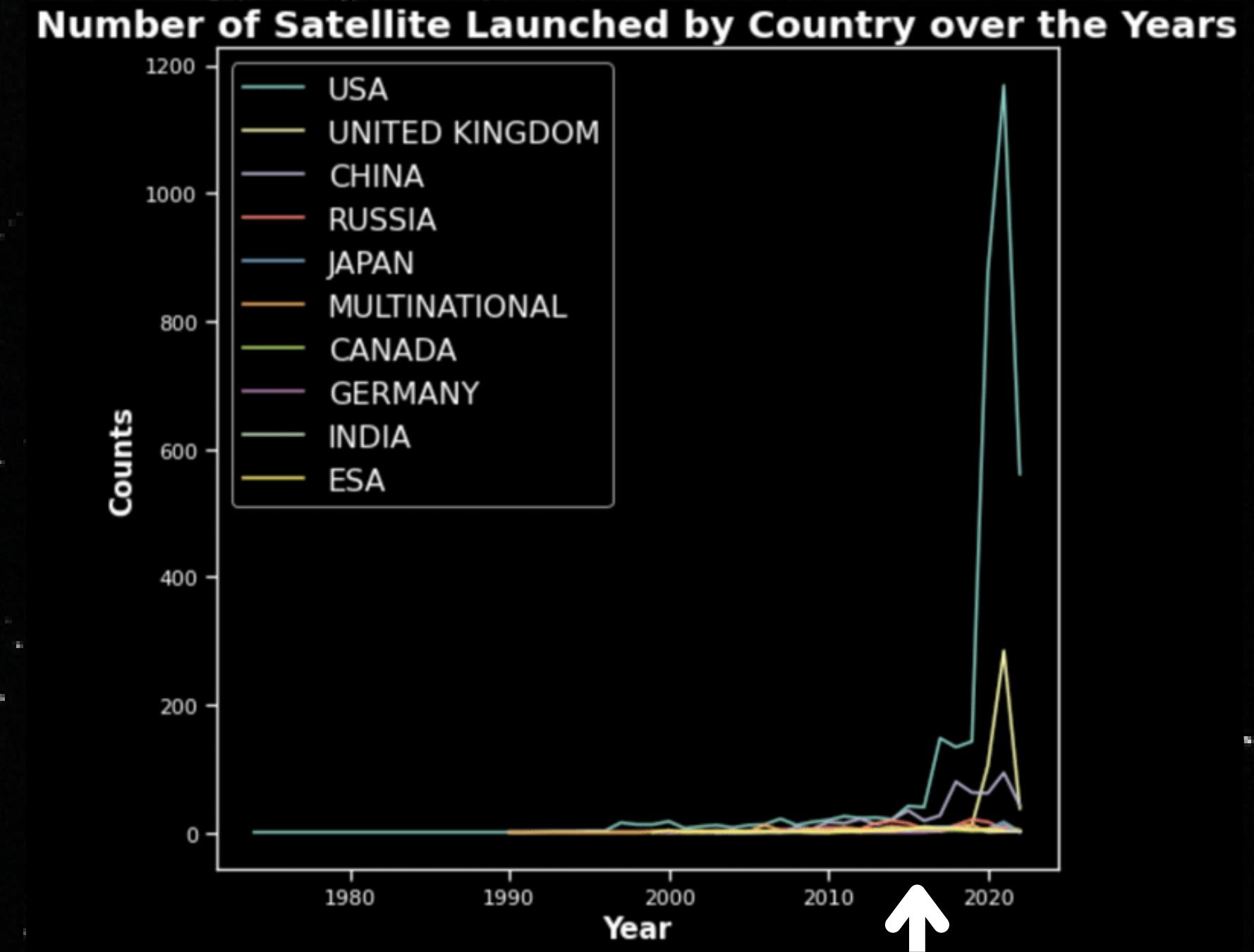


Launch Trend

Worldwide



Countries

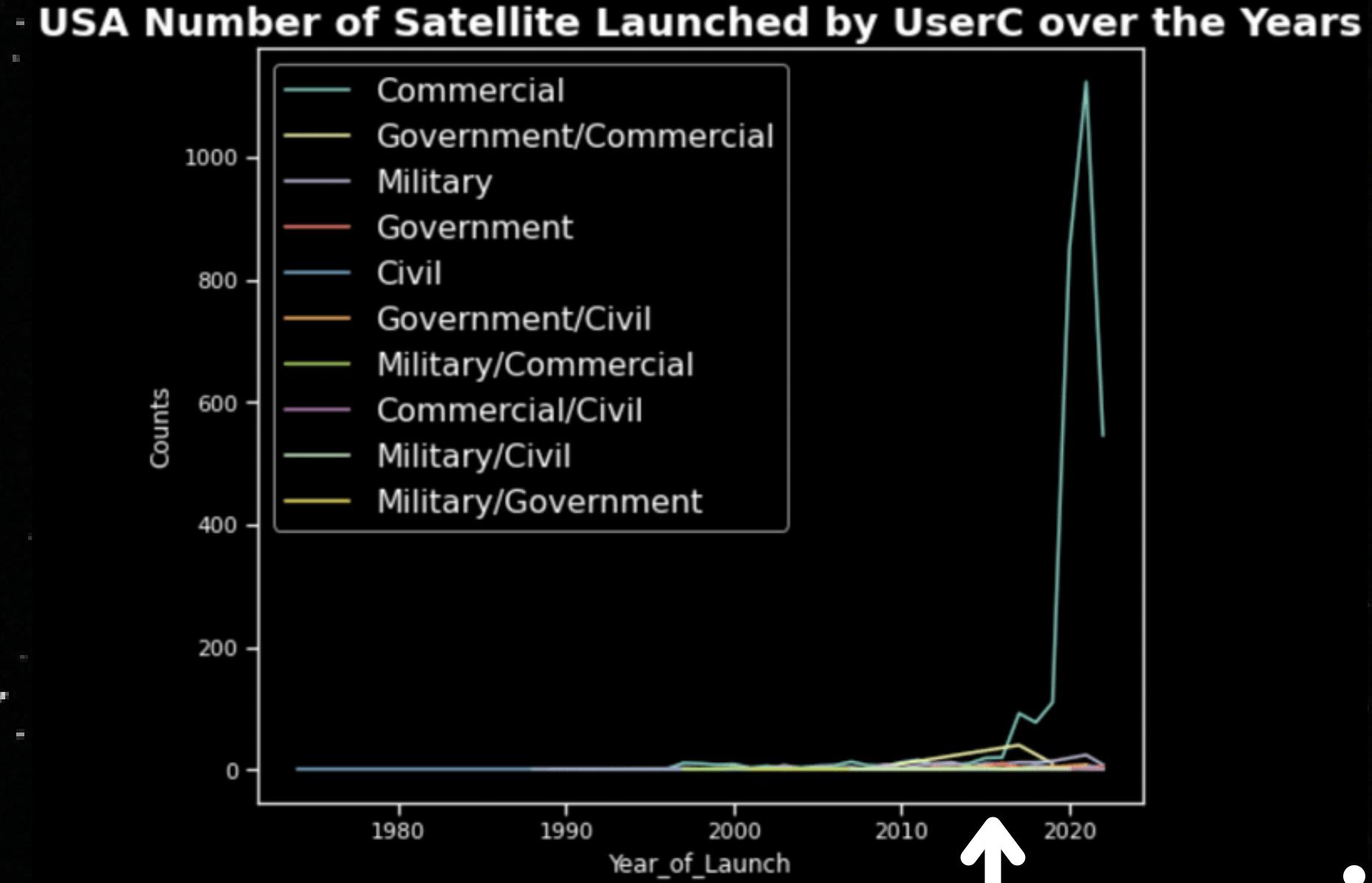


- Before 2015: gradual increase
- 2015 - 2021: surge, reach the peak

- Similar trends as worldwide
- **USA / UK / China**

Surge in USA

User



Purpose

Purpose	2015	>= 2015
Communications	135	2407
Earth Observation	5	374
Technology Development	5	25
Surveillance	0	12
Technology Demonstration	0	11

- 80% increase in Commercial user

- Satellites launched with new purposes eg. technology demonstration
- 18 times increase in communication
- 75 times increase in earth observation

Investigating the spike in satellite launches(USA)

3,415

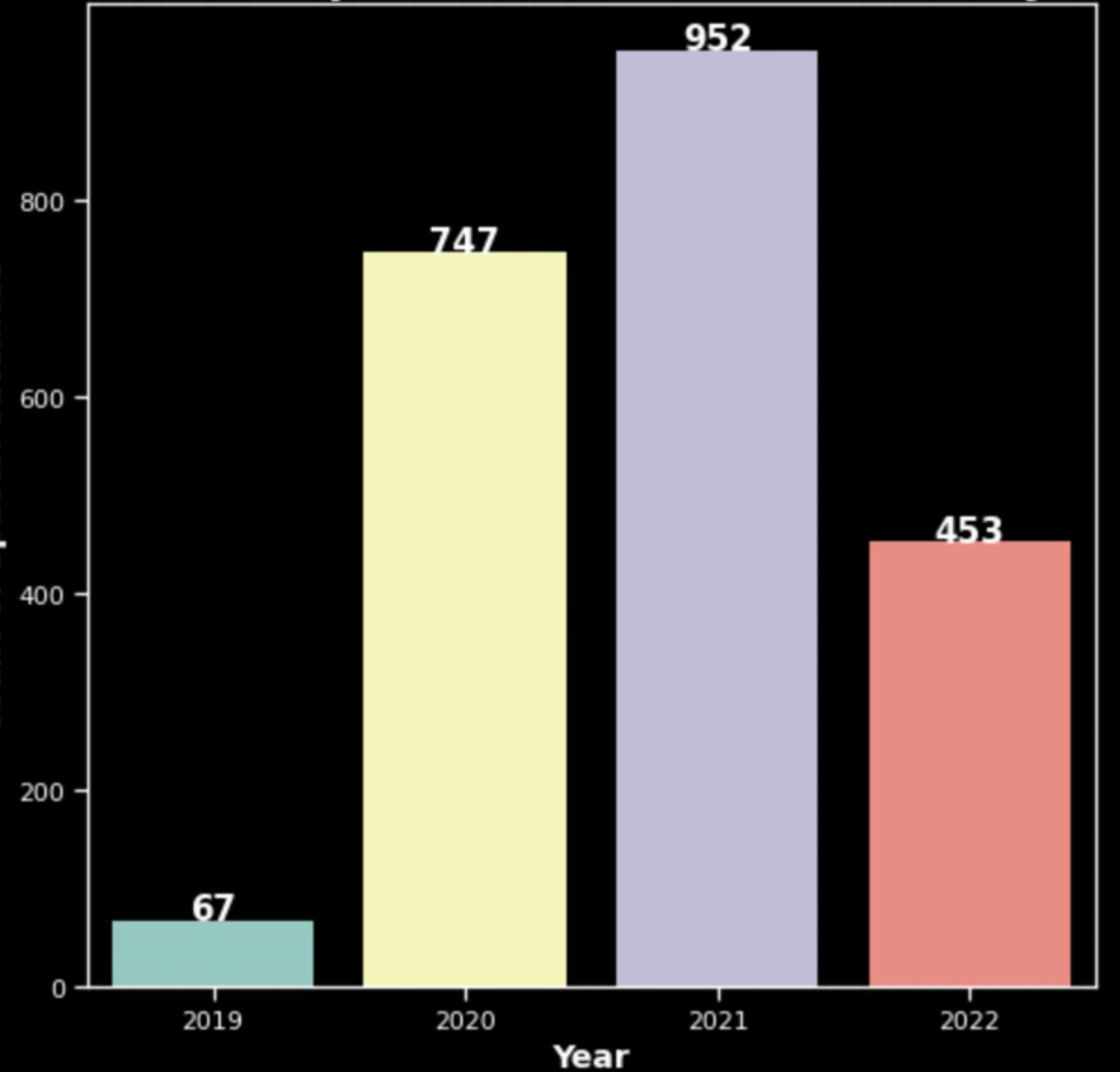
USA
Satellites



2,219

SpaceX
Satellites

Number of SpaceX Satellite Launched by USA





Starlink Satellites

3,000+

Satellites

40

Countries

550K+

Internet Subscribers



Heaviest Satellite on record (so far)

Delta IV Heavy
149 million dollars for one mission

Total mass at launch is approximately
733,000 kg including:

(LEO): 28,790 kg
(GEO): 6,750 kg



Delta IV Launch Services User's Guide | June 2013



According to Delta IV User's Guide and <https://spacenews.com/>

Thank you!

Q & A



Appendix

tables created

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 439 entries, 6 to 5446
Data columns (total 8 columns):
 #   Column           Non-Null Count  Dtype  
--- 
 0   Name of Satellite, Alternate Names    439 non-null   object 
 1   Country of Operator/Owner            439 non-null   object 
 2   Launch Mass (kg.)                  439 non-null   object 
 3   Launch Vehicle                    439 non-null   object 
 4   Dry_Mass                        439 non-null   object 
 5   Month_of_Launch                 439 non-null   int64  
 6   Year_of_Launch                  439 non-null   int64  
 7   Purpose                         439 non-null   object 
dtypes: int64(2), object(6)
memory usage: 30.9+ KB
```

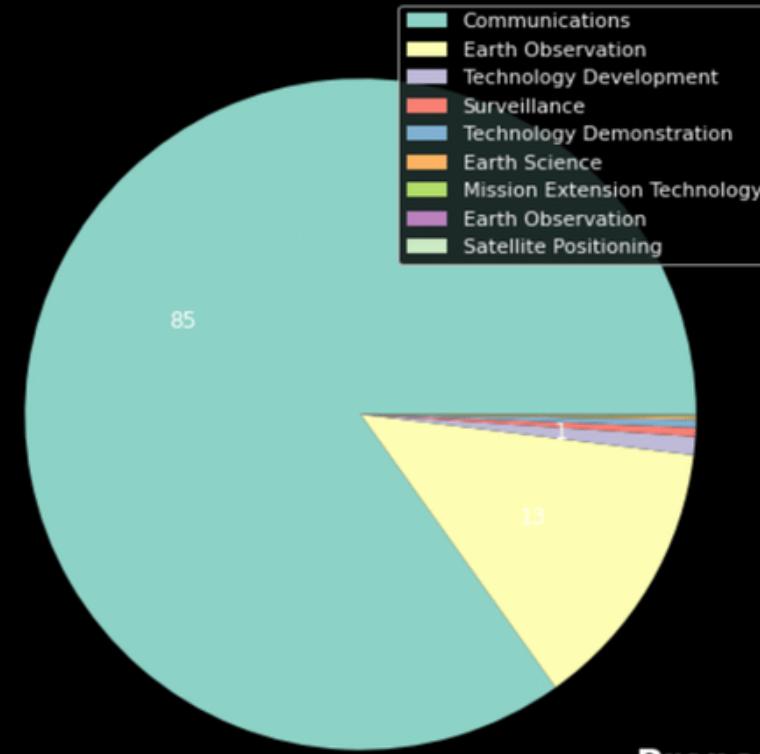
Appendix

tables created

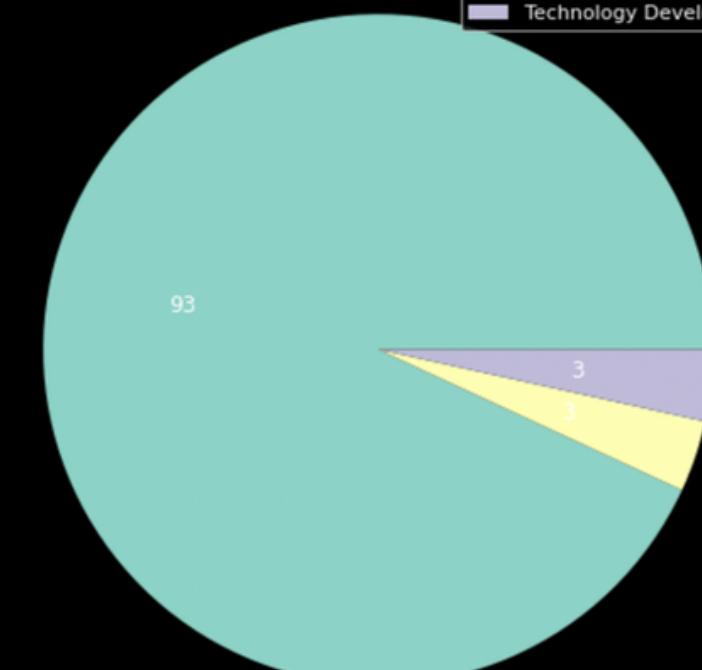
0	index	5467	non-null	int64
1	Name of Satellite, Alternate Names	5465	non-null	object
2	Current Official Name of Satellite	5465	non-null	object
3	Country/Org of UN Registry	4968	non-null	object
4	Country of Operator/Owner	5465	non-null	object
5	Operator/Owner	5465	non-null	object
6	Users	5465	non-null	object
7	Purpose	5465	non-null	object
8	Detailed Purpose	1140	non-null	object
9	Class of Orbit	5465	non-null	object
10	Type of Orbit	4843	non-null	object
11	Longitude of GEO (degrees)	5464	non-null	float64
12	Perigee (km)	5464	non-null	object
13	Apogee (km)	5465	non-null	object
14	Eccentricity	5465	non-null	float64
15	Inclination (degrees)	5465	non-null	float64
16	Period (minutes)	5449	non-null	float64
17	Launch Mass (kg.)	5225	non-null	object
18	Dry_Mass	444	non-null	object
19	Power (watts)	580	non-null	object
20	Date of Launch	5465	non-null	object
21	Expected Lifetime (yrs.)	3599	non-null	float64
22	Contractor	5463	non-null	object
23	Country of Contractor	5463	non-null	object
24	Launch Site	5464	non-null	object
25	Launch Vehicle	5465	non-null	object
26	COSPAR Number	5465	non-null	object
27	NORAD Number	5465	non-null	float64
28	Comments	1810	non-null	object

Appendix

Proportion of Purposes for USA Commercial Users(>= 2015)



Proportion of Purposes for USA Commercial Users(< 2015)



Purpose	< 2015	>= 2015
Communications	135	2407
Earth Observation	5	374
Technology Development	5	25
Surveillance	0	12
Technology Demonstration	0	11