



# Summary of the current satellite situation

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Satellite  
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Dataset  
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Key  
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Conclusion

# Data Description Database

5467  
rows

28  
columns

2  
tables

RangeIndex: 5467 entries, 0 to 5466

Data columns (total 28 columns):

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

dtypes: float64(6), object(22)



# Satellite basics

## **GEO(Geosynchronous Equatorial Orbit)**

GEO is a satellite furthest from Earth, it can cover large sections at once. It constantly stays above one particular place over Earth, such as telecommunication satellites. It can also be used for weather monitoring, because they can continually observe specific areas to see weather trends there. The limitations on expensive launch, low mobility and usages, it makes sense to not have too much of this class.

## **LEO(Low Earth Orbit)**

LEO satellites have planes that can be tilted. This means there are more available routes for satellites, which is why LEO is a very commonly used orbit. Communication satellites in LEO often work as part of a large combination or constellation of multiple satellites to give constant coverage. In order to increase coverage, several of the same or similar satellites are launched together to create a 'net' around Earth. This smoothly explains why LEO has the most records.

## **MEO(Medium Earth Orbit)**

MEO comprises of a range between LEO and GEO. It does not need to take specific paths around Earth. It is very commonly used by navigation satellites, like the European Galileo system. It provides a coverage across large parts of the world all at once. It is interesting that this has less records than GEO.

# Data cleaning



NEVER SL

## Moon

Do not go gentle into that  
good night, Old age should  
burn and rave at close of day

1969



## Mars

Do not go gentle into that  
good night, Old age should  
burn and rave at close of day

1998



## Comet

Do not go gentle into that  
good night, Old age should  
burn and rave at close of day

2020



## By Country

- US (62%) had the most number of satellites launched. This large volume is primarily driven by SpaceX. China (10%) came second followed closely by United Kingdom (9%) and Russia (3%)

Gentle  
That Go

Country of Operator/Owner	
USA	3415
CHINA	536
UNITED KINGDOM	486
RUSSIA	170

- All Satellite purpose for each user:

PPT, NEVER SLEEPS

Satellites are used for commercial purposes (75%), government purposes (10%), military purposes (8%), civil purposes (3%). The remaining are used for multi purposes.

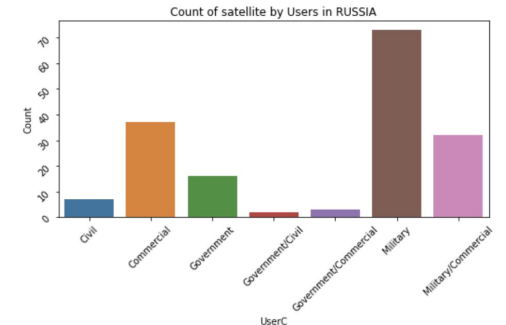
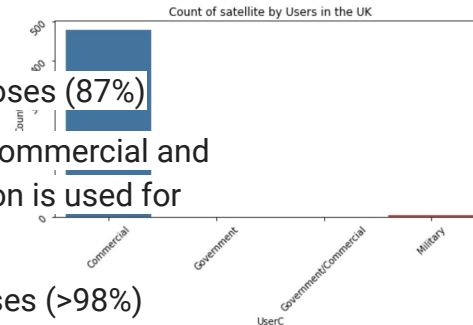
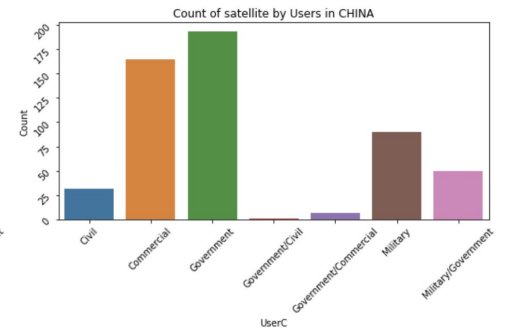
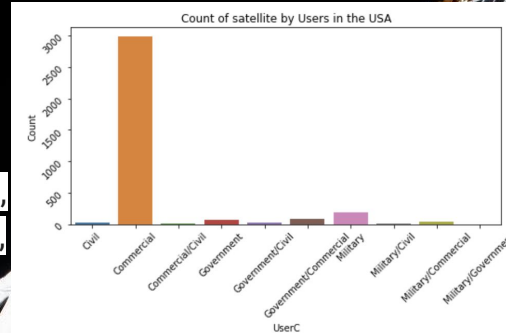
### Satellite usage by country:

US: Most of the satellites are used for commercial purposes (87%)

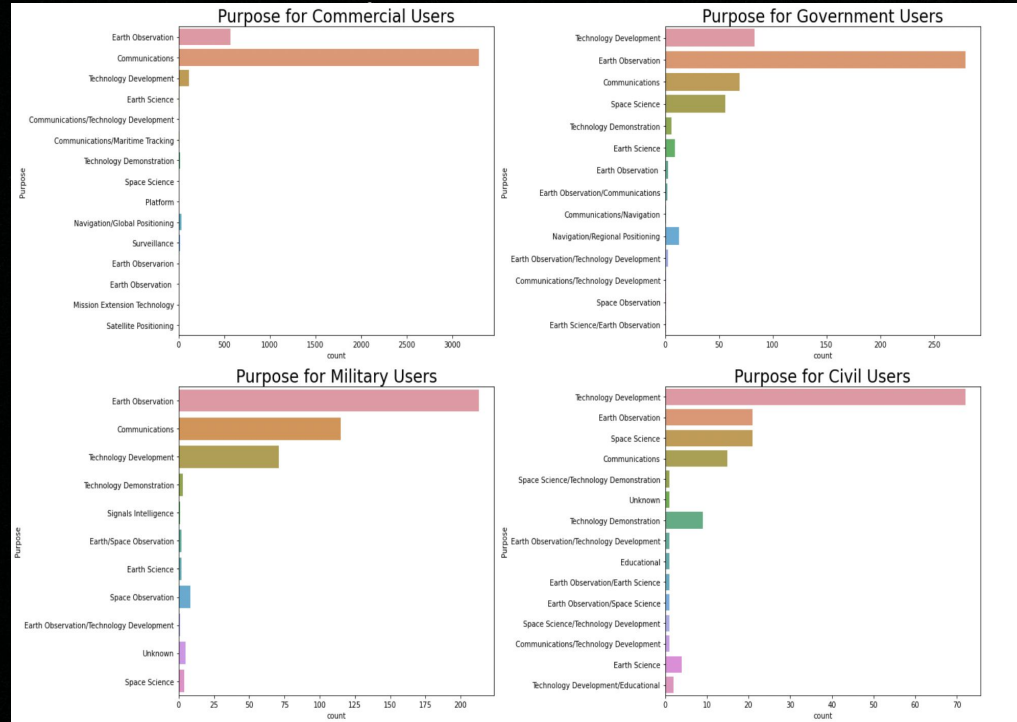
China: Roughly two-thirds of the satellites are used for commercial and government purposes equally (68%), while a small portion is used for military (18%)

UK: Almost all satellites are used for commercial purposes (>98%)

Russia: Majority of the satellites are used for Commercial and Military purposes (82%)



# Propose for TOP User



**Commercial**: Communications, Earth Observation

**Government**: Earth Observation, Technology Development, Communication, Space Science

**Military**: Earth Observation, Communications

**Civil**: Technology Development

Multi-user (4 types)

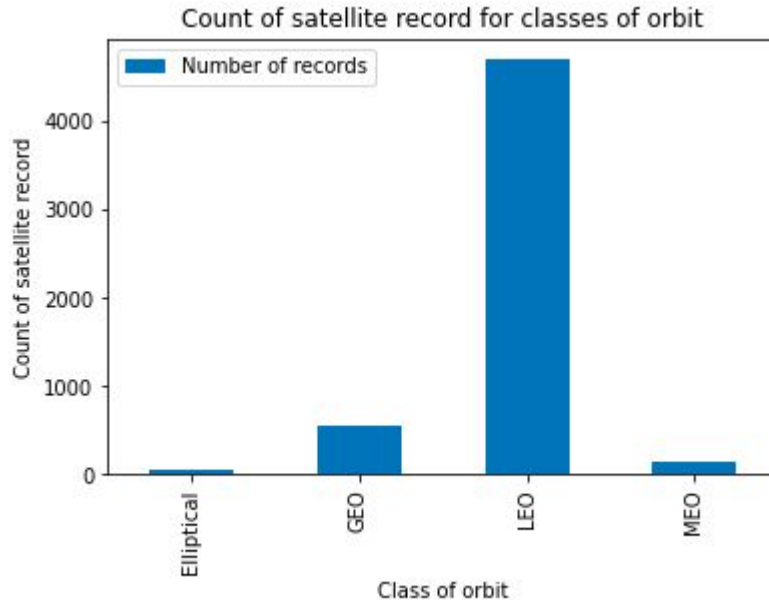
**Government-Commercial**: Communication

# SPACE TRAVEL

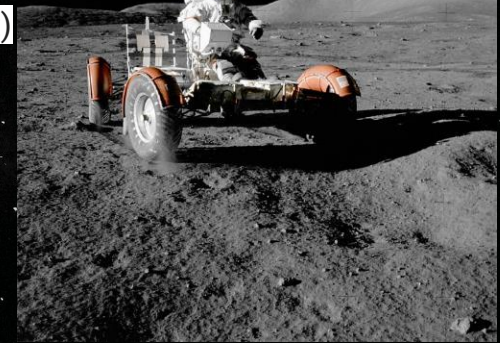
PPT NEVER SLEEPS

- **Satellite orbit class distribution**

Around 86% of total satellites fall under LEO(Low Earth Orbit), one of the most common orbits, due to its close proximity to Earth. Approximately 90% of LEO Satellites are used for commercial purposes. Around 10% of satellites fall under GEO(Geosynchronous Equatorial Orbit), which is



Orbit)



## Moon

Do not go  
good night  
burn and r

## Comet

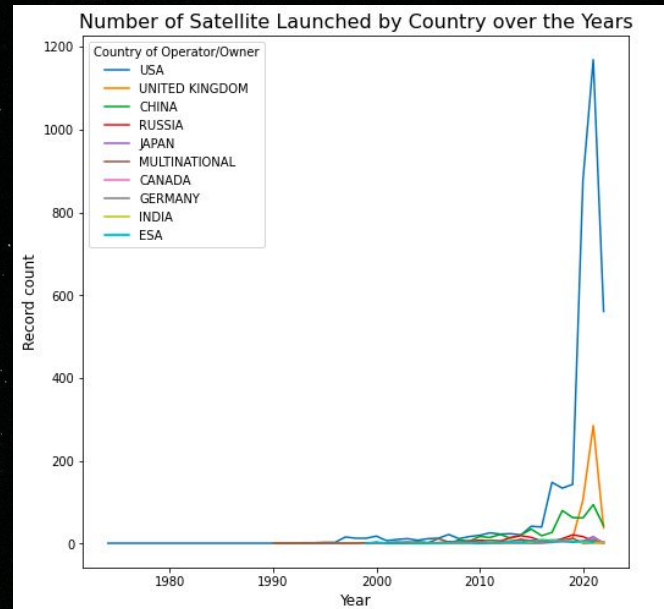
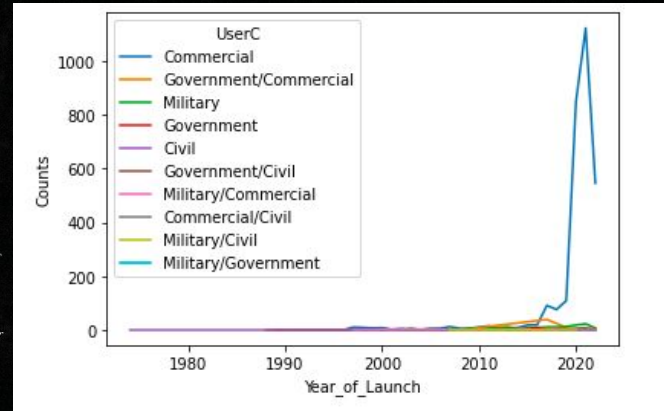
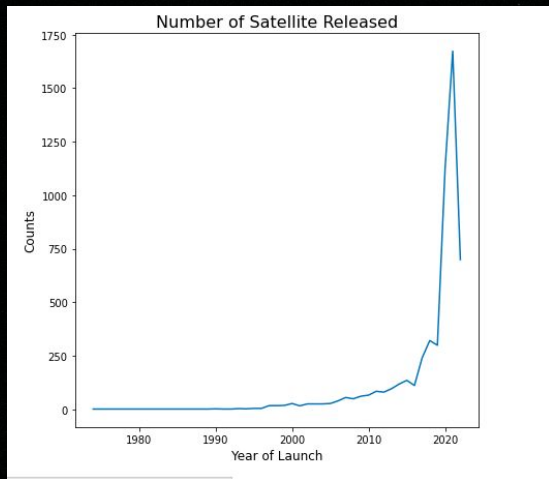
Do not go gentle into that  
good night, Old age should  
burn and rave at close of day

2020



# Launch Trend

- Peak: 2015 and 2020
- 80% increase in Commercial
- After 2015, USA surge, UK / China upward trend
- After 2020, decline, most likely due to COVID-19 delaying launches

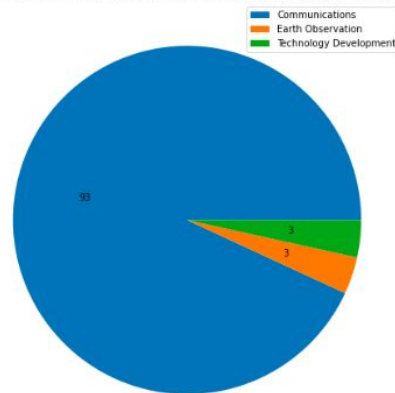


# Surge in USA

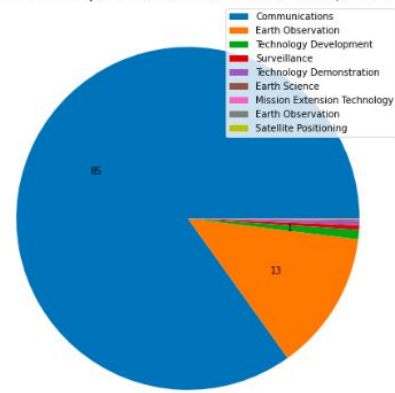
- 17 times increase in communication
- 70s times increase in earth development
- New purposes' satellite launched

Purpose	<2015	>=2015
Communications	135	2407
Earth Observation	5	374
Technology Development	5	25
Surveillance	0	12
Technology Demonstration	0	11
Earth Science	0	3
Mission Extension Technology	0	2
Earth Observation	0	1
Satellite Positioning	0	1

Proportion of Purposes for USA Commercial Users(< 2015)

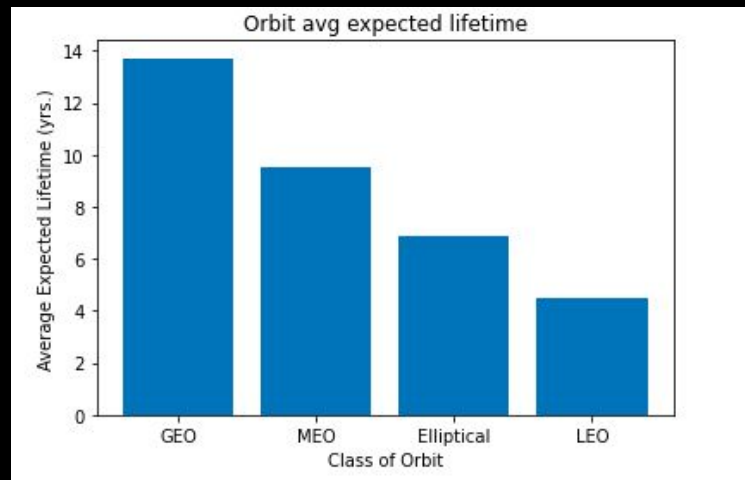
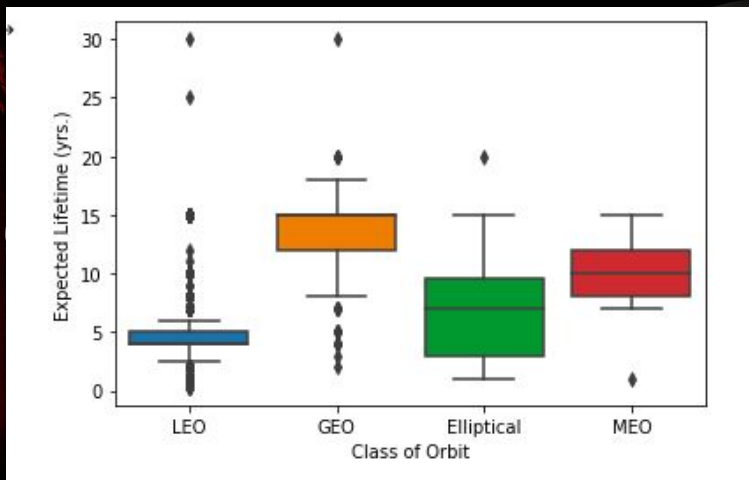


Proportion of Purposes for USA Commercial Users(>= 2015)



# That Good Night

PPT NEVER SLEEPS



Grave men, near death, who see with blinding sight  
Blind eyes could blaze like meteors and be gay,  
Rage, rage against the dying of the light. And you, my father, there  
on the sad height, Curse, bless me now with your fierce tears, I pray.  
Do not go gentle into that good night. Rage, rage against the dying of the light.



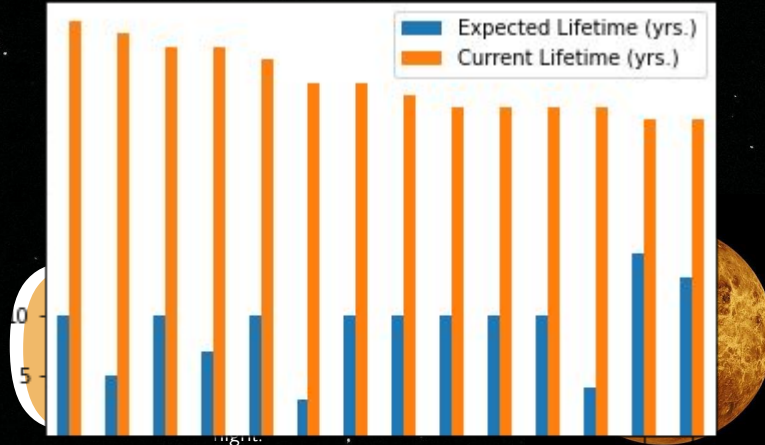
S

Do not go gentle into that good night,  
Old age should burn<sup>7</sup> and  
rave at close of day; Rage, rage  
against the dying of the light.



Though wise men at their end know  
dark is right, Because their words had  
forked no lightning they Do not go  
gentle into that good night.

T



W

Good men, the last wave by, crying  
how bright. Their frail deeds might  
have danced in a green bay, Rage,  
rage against the dying of the light.

	Launch Mass (kg.)	Dry_Mass	Year_of_Launch	Launch Vehicle & Fuel Weight (kg.)
Launch Mass (kg.)	1.000000	0.960338	-0.039396	0.939159
Dry_Mass	0.960338	1.000000	-0.005646	0.806132
Year_of_Launch	-0.039396	-0.005646	1.000000	-0.076648
Launch Vehicle & Fuel Weight (kg.)	0.939159	0.806132	-0.076648	1.000000

Good men, the last wave by: crying how bright. Their frail deeds might have  
danced in a green bay. Rage, rage against the dying of the light.

# Investigating the spike in satellite launches by country (USA)

Do not go gentle into that good  
night, Old age should burn and  
rave at close of day.

Though wise men at their end  
know dark is right, Do not go  
gentle into that good night.

Good men, the last wave by,  
crying how bright. Their frail  
deeds might have danced in,

Wild men who caught and sang  
the sun in flight, And learn, too  
late, they grieved it on its way

Grave men, near death, who see  
with blinding sight. Rage, rage  
against the dying of the light.

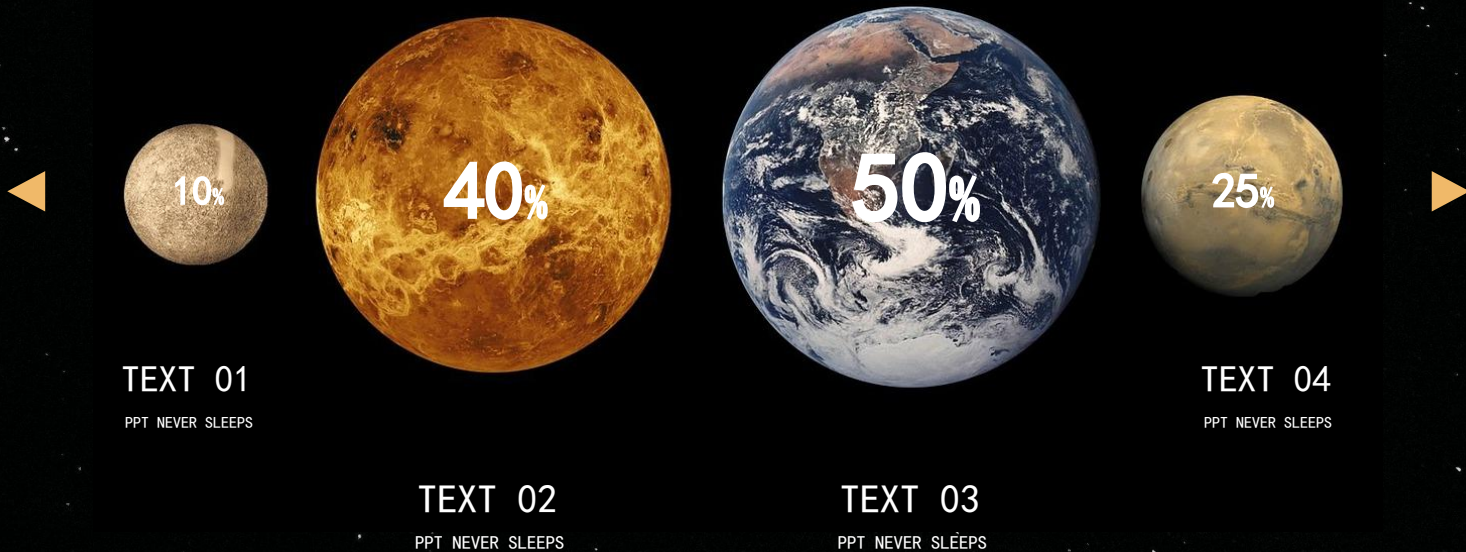
And you, my father, there on  
the sad height, Curse, bless me  
now with your fierce tears





# That Good Night

PPT NEVER SLEEPS



# PART. 03

PPT NEVER SLEEPS

Wild men who caught and sang the sun in flight, And learn, too late, they grieved it on its way, Do not go gentle into that good night.







PPT NEVER SLEEPS

# Do Not Go Gentle Into That Good Night

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- ✓ And you, my father, there on the sad height,
- ✓ Curse, bless me now with your fierce tears, I pray.
- ✓ Do not go gentle into that good night.
- ✓ Rage, rage against the dying of the light.







1999. 8. 6

PPT NEVER SLEEPS

1976. 2. 10

PPT NEVER SLEEPS

1980. 12. 5

PPT NEVER SLEEPS

1958. 9. 15

PPT NEVER SLEEPS

Grave men, near death, who see with blinding sight  
Blind eyes could blaze like meteors and be gay,  
Rage, rage against the dying of the light.  
And you, my father, there on the sad height,  
Curse, bless me now with your fierce tears, I pray.  
Do not go gentle into that good night.  
Rage, rage against the dying of the light.





# PART. 04

PPT NEVER SLEEPS

Grave men, near death, who see with blinding sight. Blind eyes could blaze like meteors and be gay, Rage, rage against the dying of the light.





Do Not Go  
Gentle Into  
That Good  
Night —



And you, my father, there on the sad height, Curse, bless me now with your fierce tears, I pray. Do not go gentle into that good night. Rage, rage against the dying of the light.

TEXT 01

PPT NEVER SLEEPS

TEXT 02

PPT NEVER SLEEPS

TEXT 03

PPT NEVER SLEEPS



# THAT GOOD NIGHT

Do not go gentle into that good night,  
Old age should burn and rave at close of  
day; Rage, rage against the dying of the  
light.



TEXT 04

PPT NEVER SLEEPS

TEXT 05

PPT NEVER SLEEPS

TEXT 06

PPT NEVER SLEEPS

Though wise men at their end know dark is  
right, Because their words had forked no  
lightning they Do not go gentle into that  
good night.



## That Good Night

Do not go gentle into that good night,  
Old age should burn and rave at close of day;  
Rage, rage against the dying of the light.

—

## Crying How Bright

Though wise men at their end know  
dark is right, Because their words had  
forked no lightning they Do not go  
gentle into that good night.



69%

PPT NEVER SLEEPS



# Delta IV Heavy

**\$149 million price for one mission**

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

**(LEO): 28,790 kg**

**(GEO): 6,750 kg**

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



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# TITANKS

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# ANSWER

PPT NEVER SLEEPS



Q & A