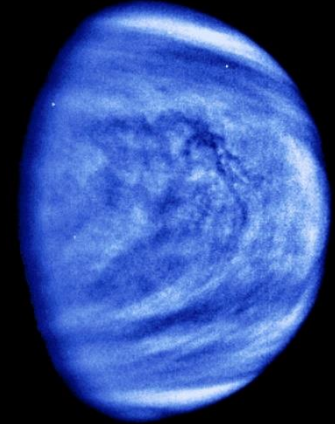
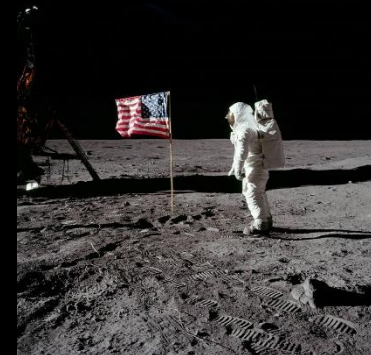


History of Spaceflight



Acknowledgments:
Steven LJ Russo
NASA
ESA



Learning Objectives

- To set the context for the lectures that follow...
- To be able to describe the principal pioneers and most important programs in the exploration of space...

BUT THIS LECTURE IS NOT EXAMINABLE!

Space firsts

Event	Who	When
First rockets	Chinese	13 th C.
First liquid fuel rocket	'Nell', Goddard	1926
First rocket in space	A-4 (V-2), Von Braun	1944
First satellite	R-7, Sputnik-1	1957
First flight by man	Vostok1, Yuri Gagarin	1961
First EVA	Voskhod2, Alexei Leonov	1965
First rendezvous	Gemini 6/7	1966
First docking of 2 spacecraft	Gemini 8/Agena	1966
First lunar landing	Apollo 11, Armstrong, Aldrin, Collins	1969
First space station	Salyut 1/Soyuz 11, Dobrovolski, Patsaev, Volkov	1971
First winged vehicle	Space Shuttle Columbia	1981
Longest space stay	Valeri Polyakov, 437 days	1988

1500 China



1897 Rocket Equation - Tsiolkovsky





1926 Robert Goddard

Several days later, the New York Times said:

“Since there is nothing for rockets to push against in outer space, space flight will always be impossible.”

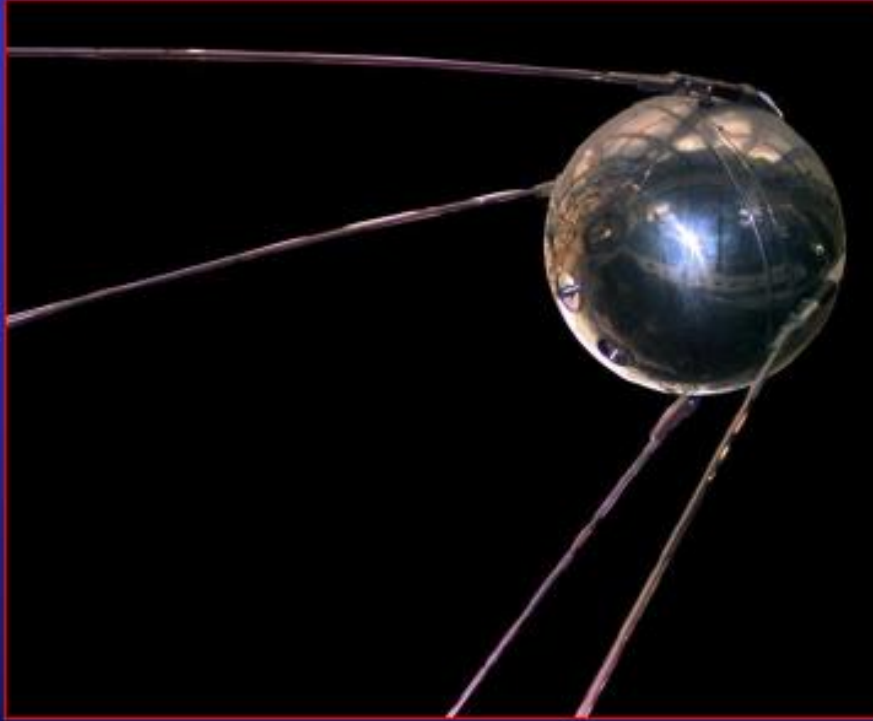
V2 Rocket



?



Sputnik



November 3, 1957. Sputnik 2



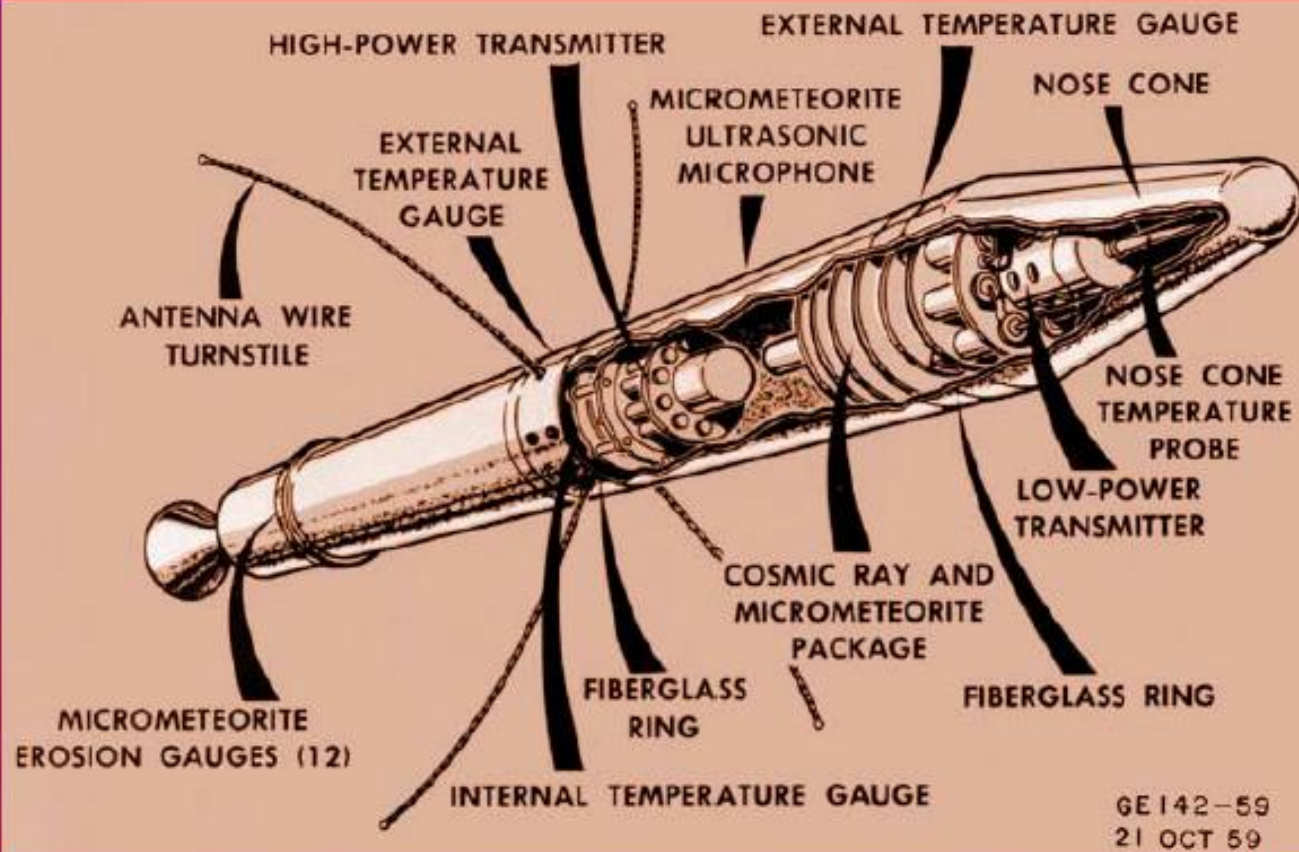
Vostok



First Woman in Space



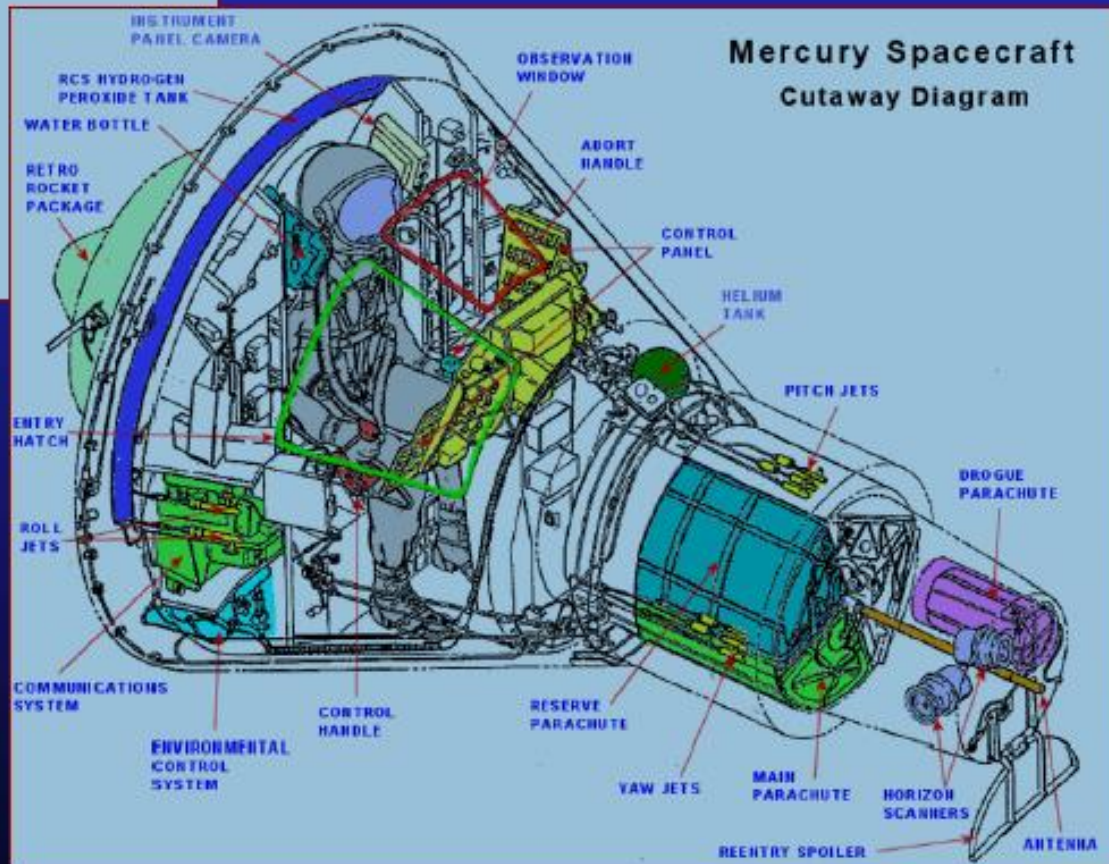
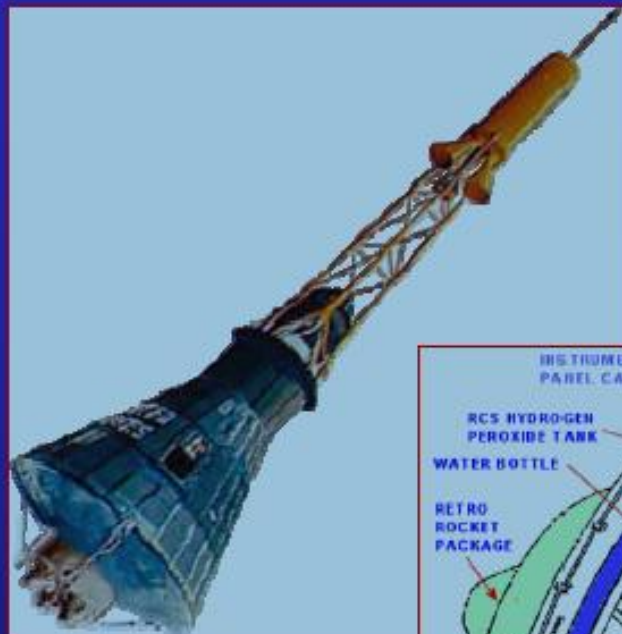
Explorer 1



They did the trajectory calcs by hand!



Mercury



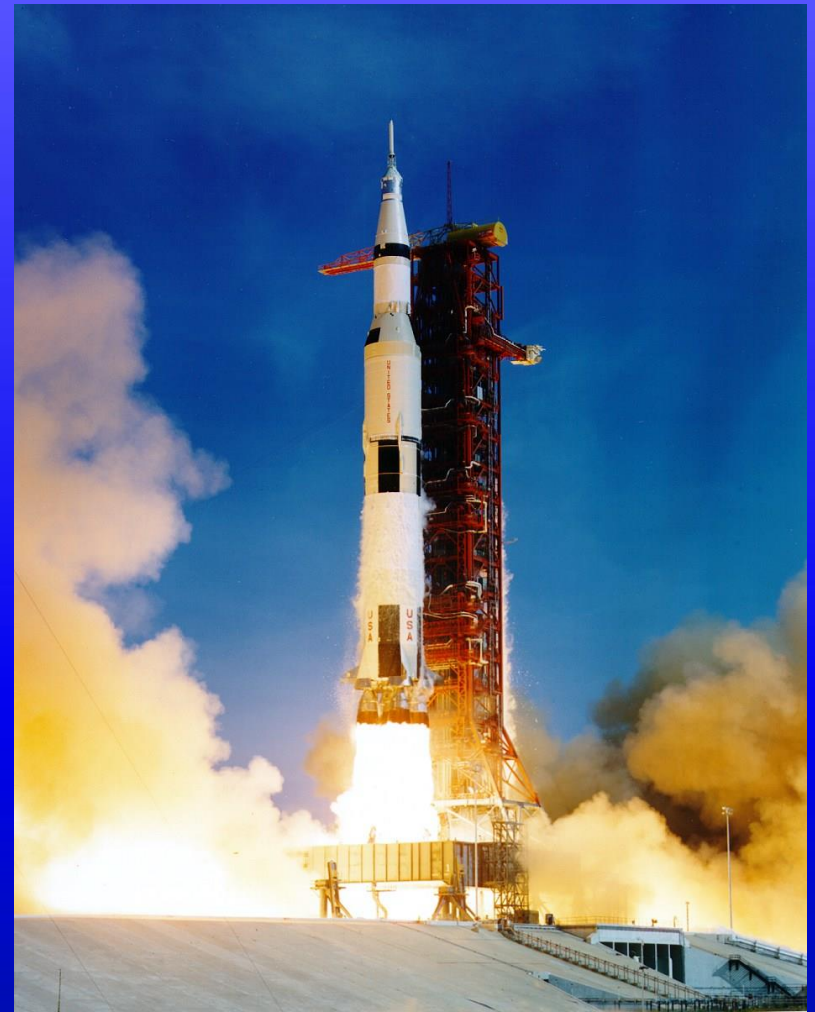
Gemini



July 16, 1969, 9:32 A.M. EDT

“...we have a liftoff; 32 minutes past the hour; liftoff of Apollo 11.”

Neil Armstrong, Michael Collins, Buzz Aldrin

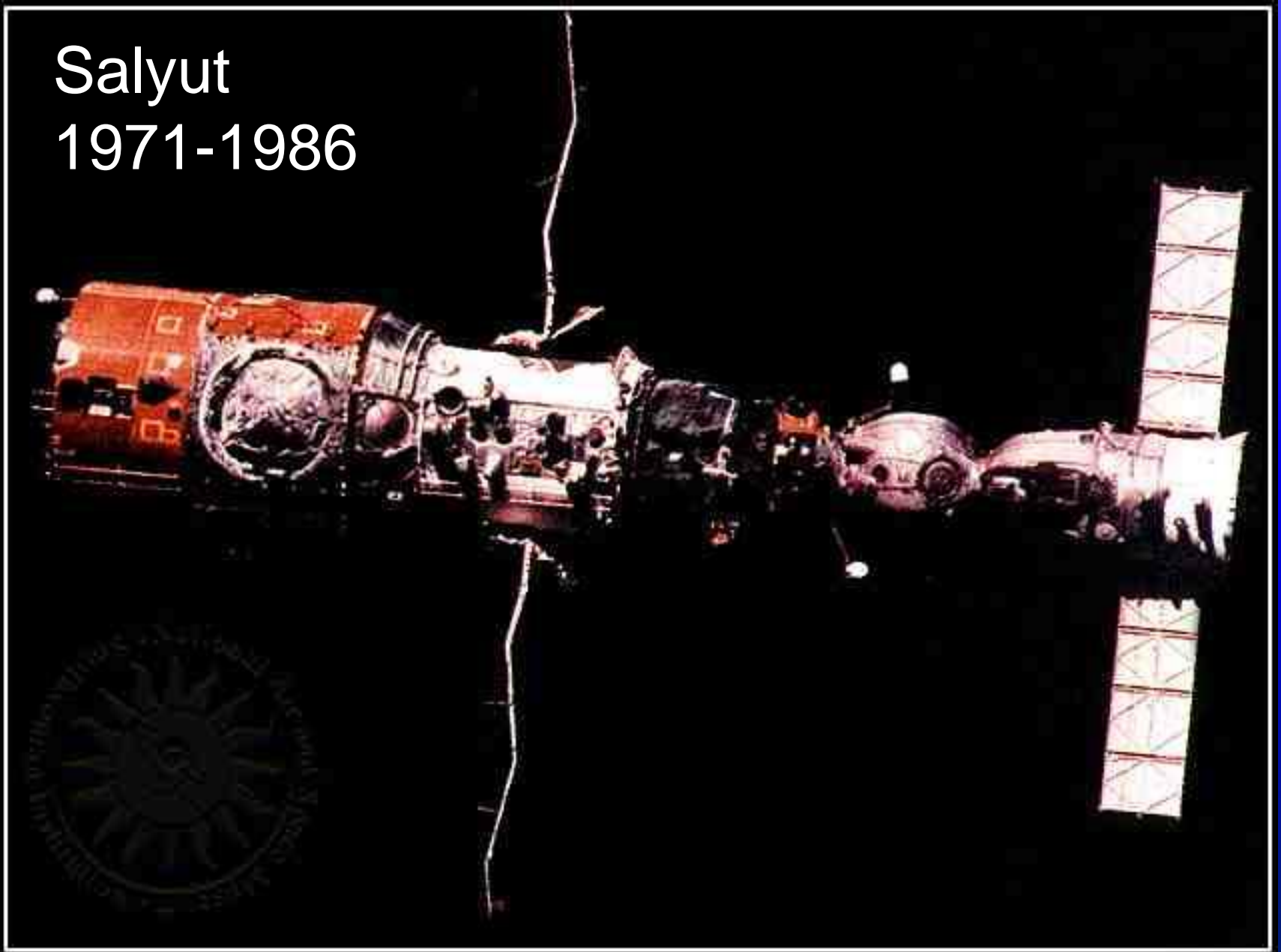


Saturn V Rocket



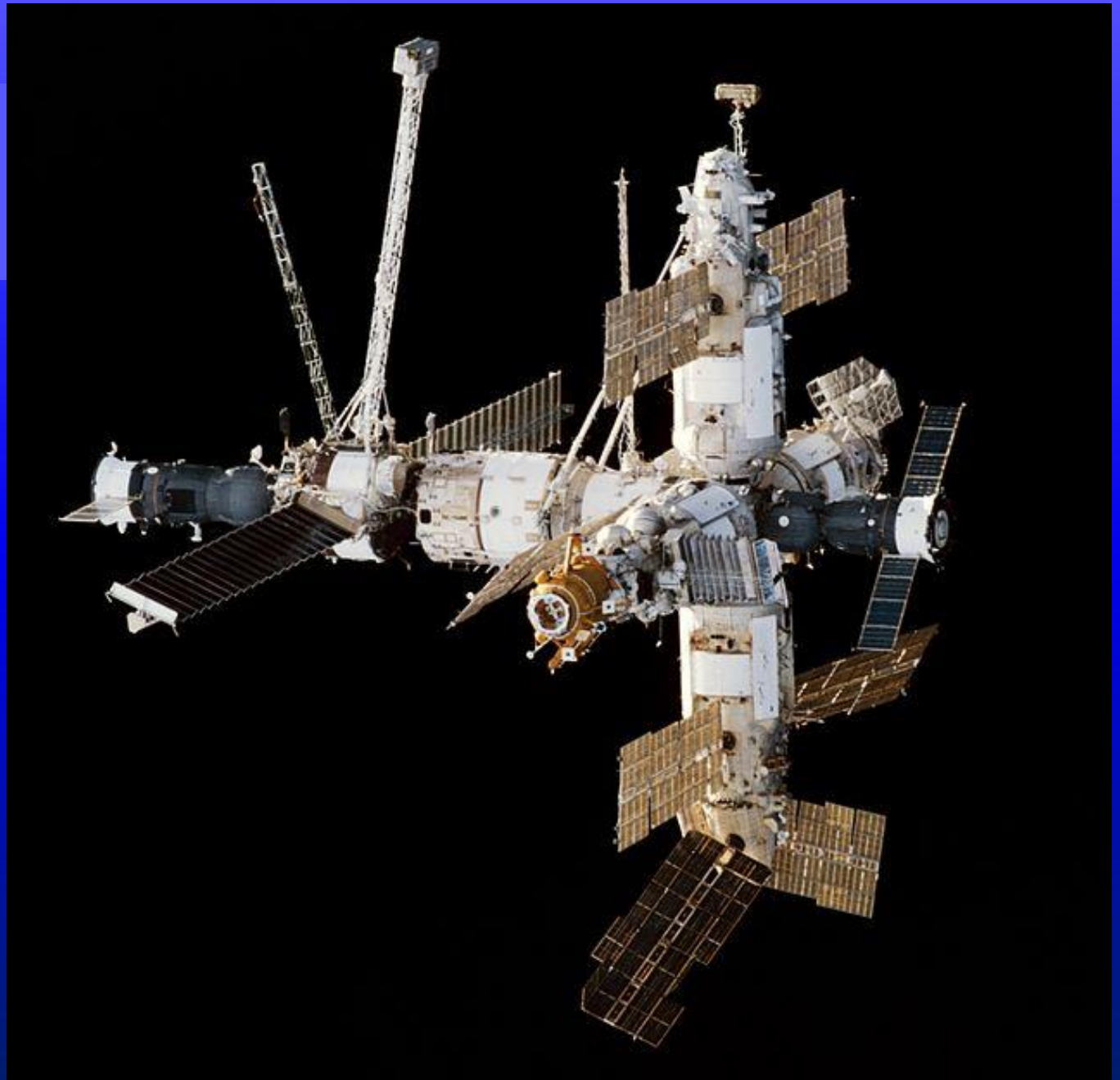
Salyut

1971-1986



Mir

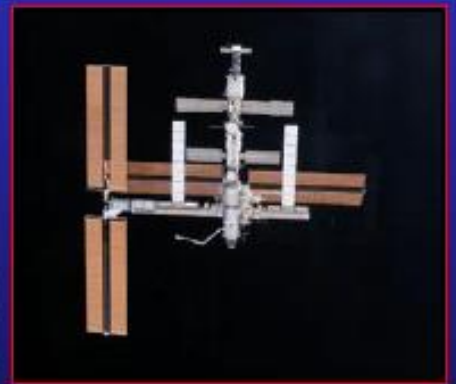
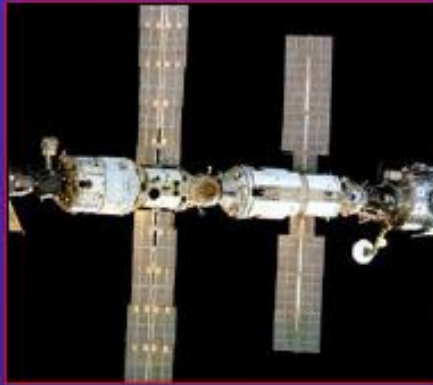
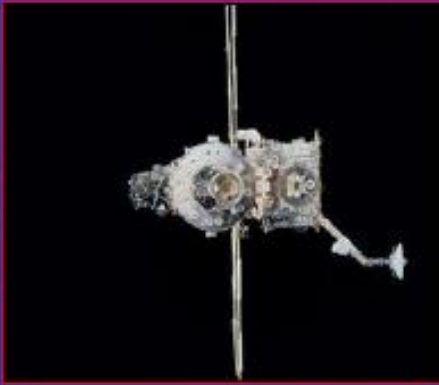
1986-2001



Skylab 1973-79

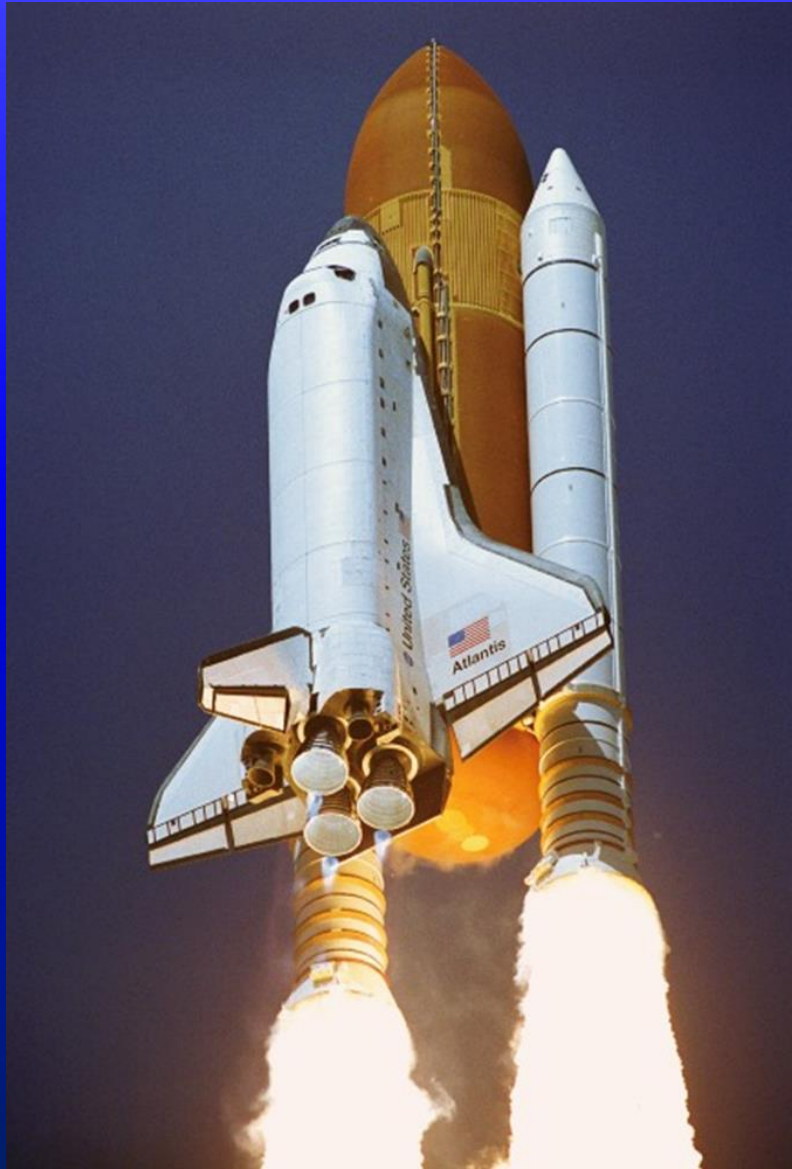


International Space Station



<http://www.n2yo.com/space-station/>

Space Shuttle 1981-2011



Space Shuttles

OV-099 Challenger

OV-101 Enterprise

OV-102 Columbia

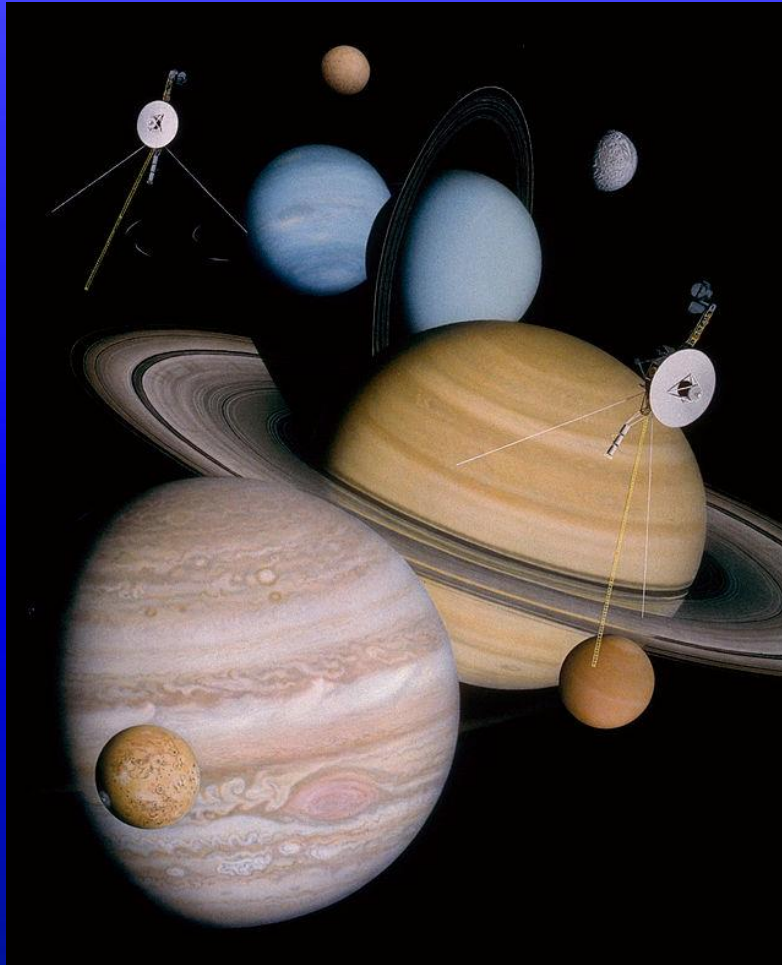
OV-103 Discovery

OV-104 Atlantis

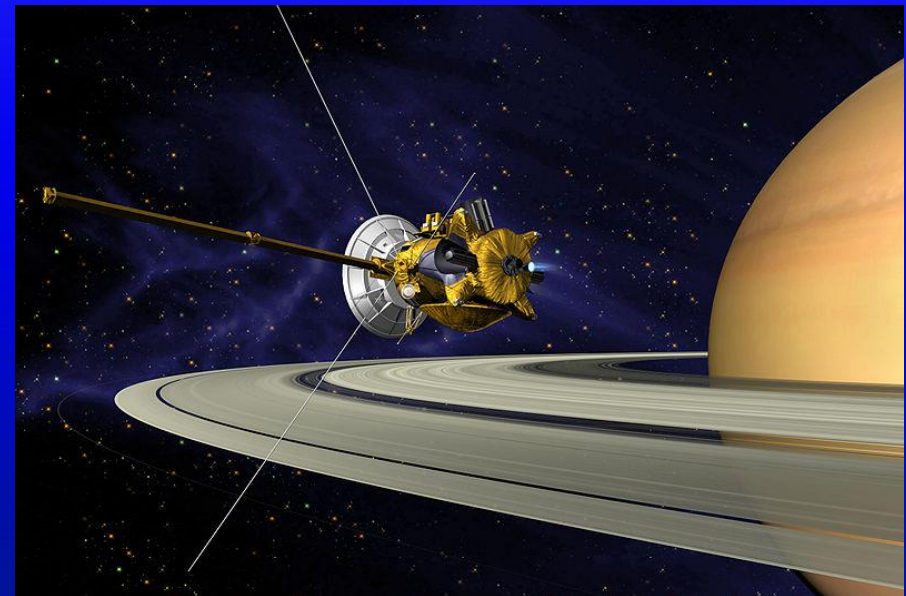
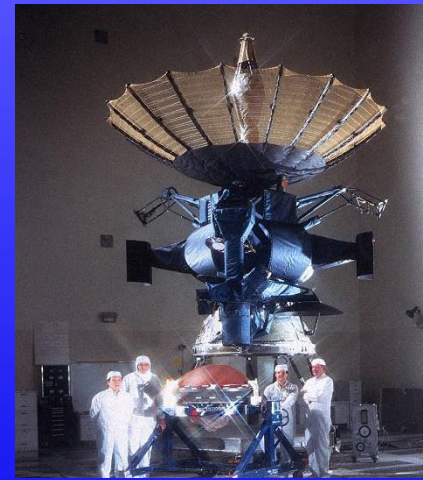
OV-105 Endeavour

Hubble Space Telescope



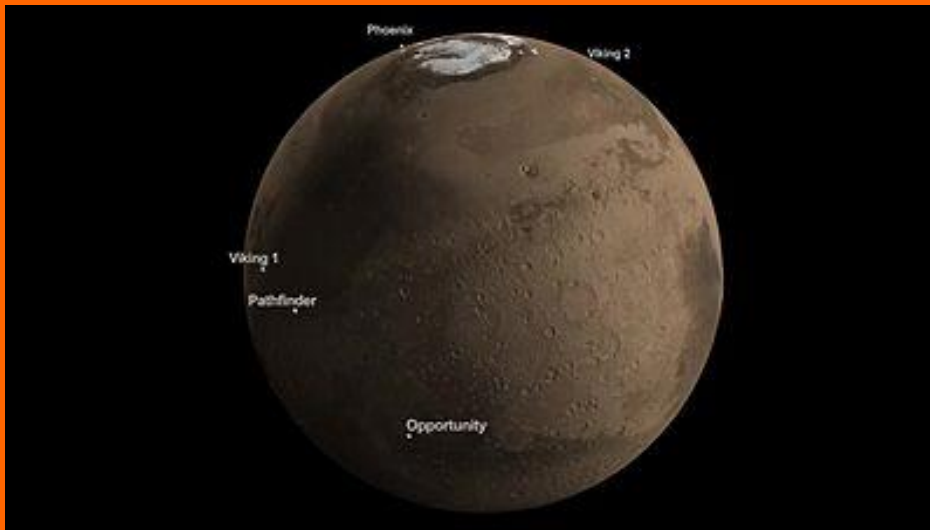
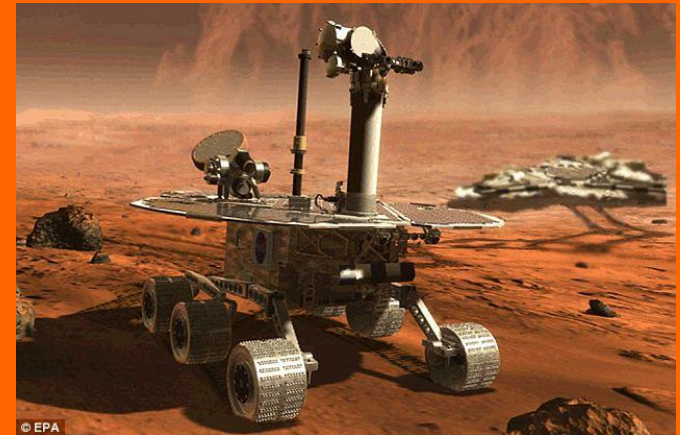
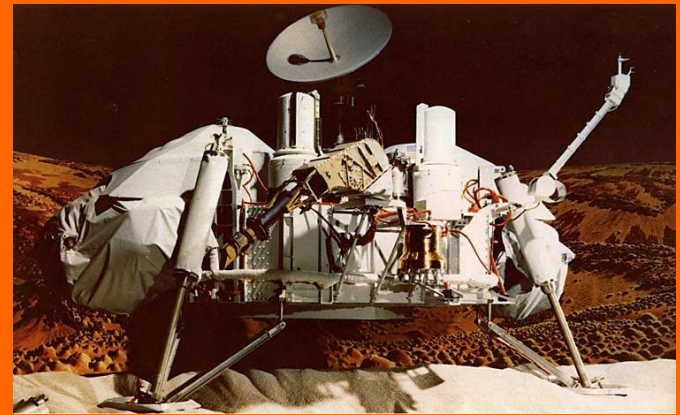


The Pioneers and Voyagers flyby Jupiter, Saturn, Uranus, Neptune, 1974 -1989.



Galileo and Cassini visit Jupiter 1995 and Saturn in 2004.

50 or so missions have tried to get to Mars. Amongst others, the Viking program were the first. Spirit, Opportunity, Phoenix and Curiosity were all successful landers.

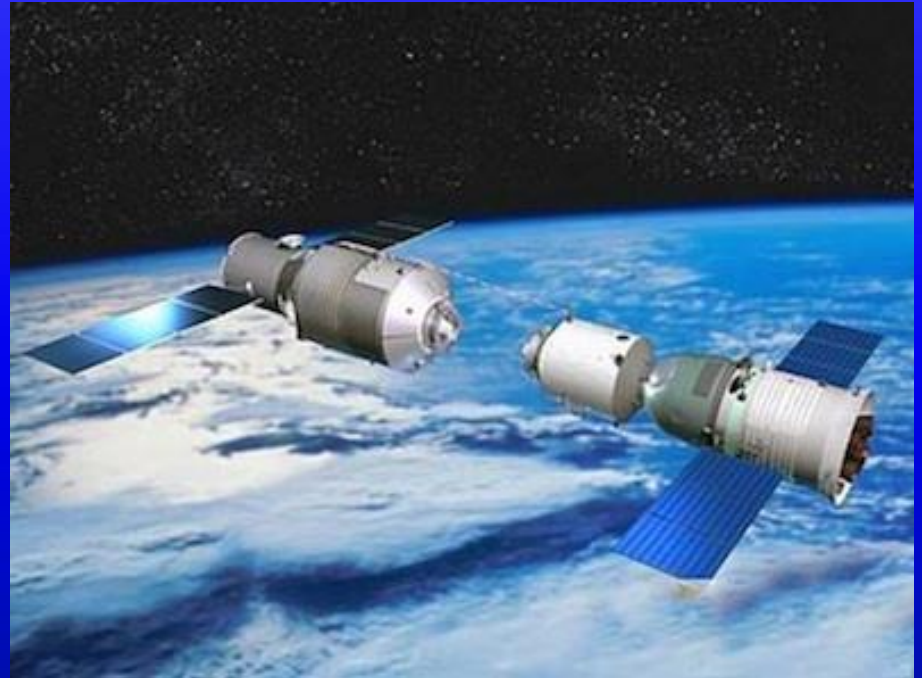


https://www.youtube.com/watch?v=W_wvan-28Tw

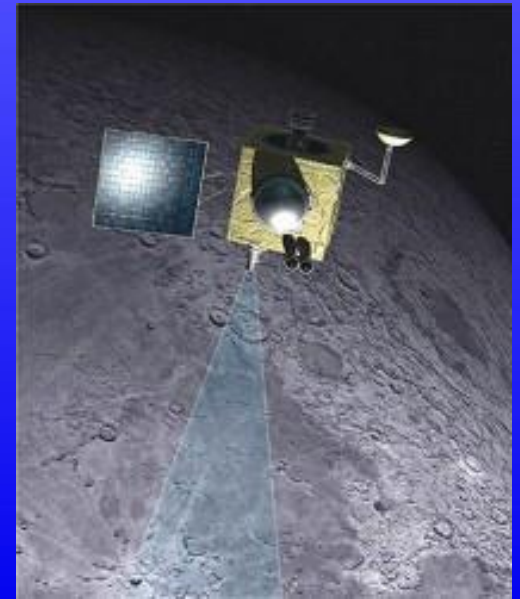
Space tourism



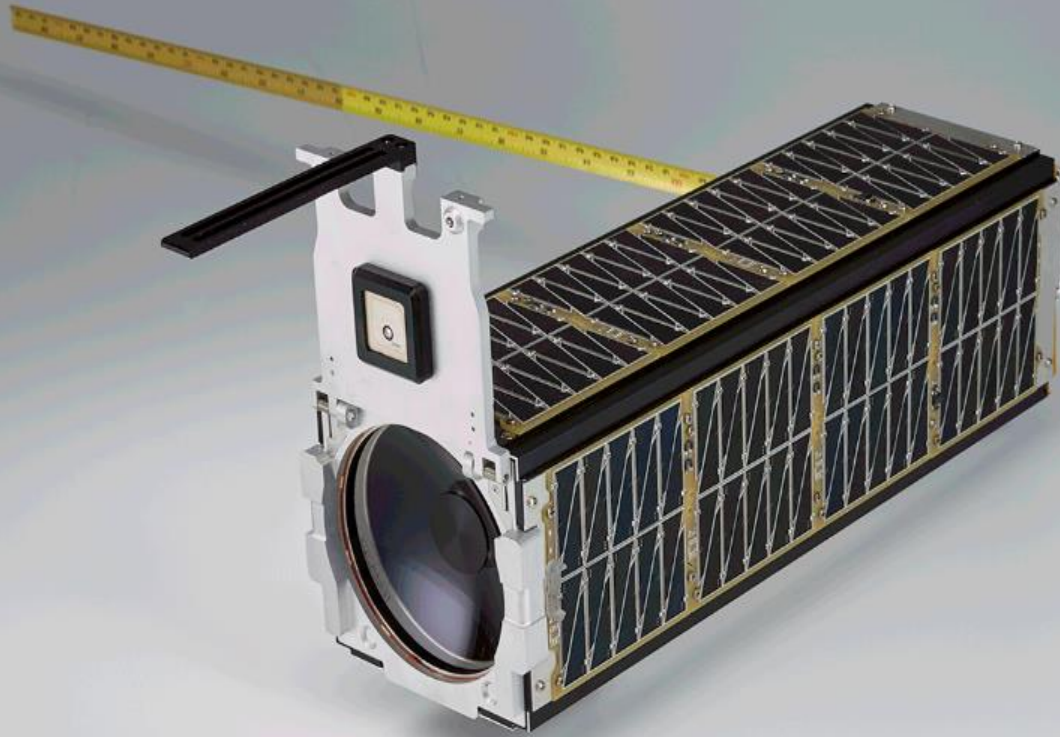
Chinese Space Program

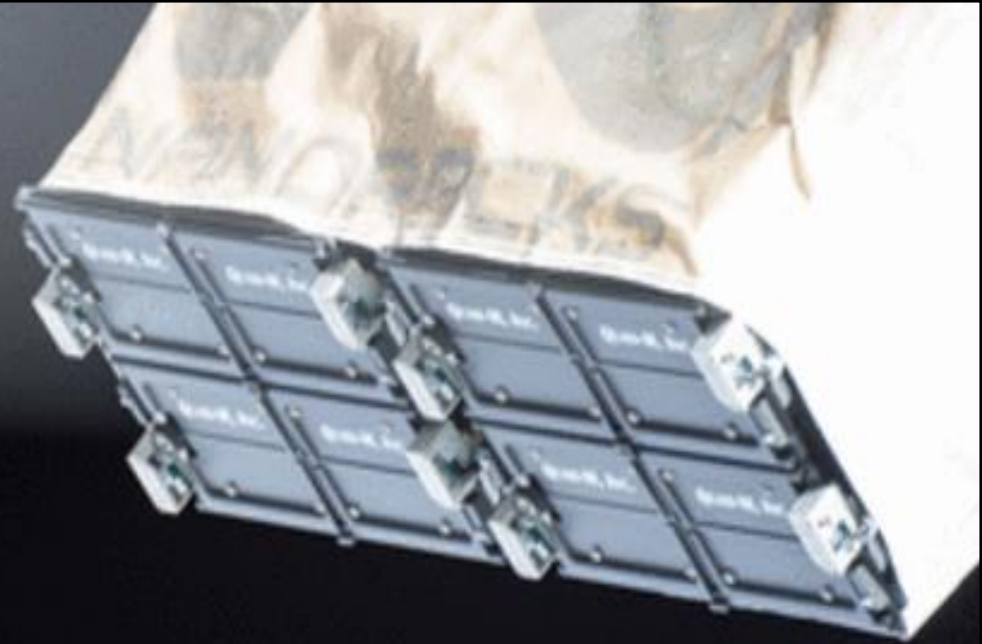


Indian Space Program



Planetlabs - rapid prototyping





PlanetLabs – mass deployment

Image credit: NASA

Space X landing

