

-In 1957-1958 President Eisenhower launched one of the first international cooperative initiatives of the space age through a series of letters he sent to the Soviet leadership. He suggested creating a process which would lead to secure space for peaceful uses.

-It led to United Nations to develop a legal framework for peaceful space activities

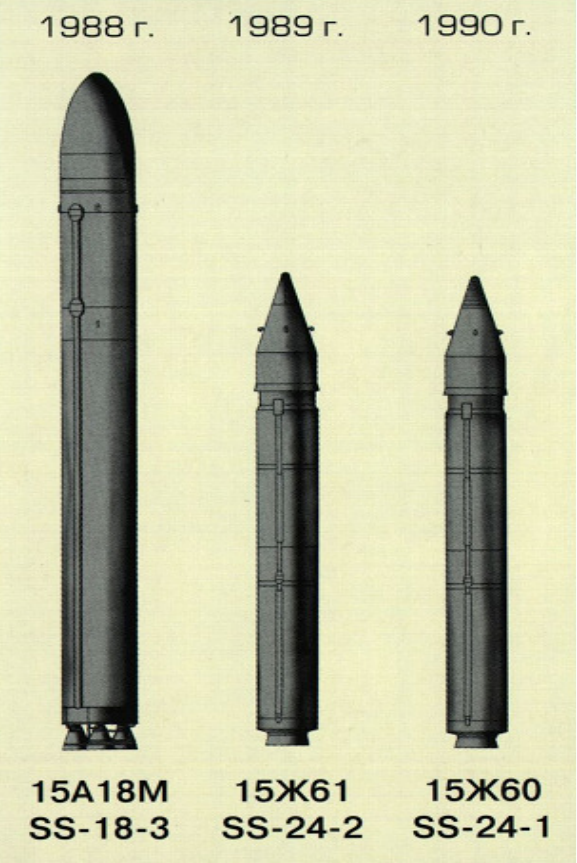
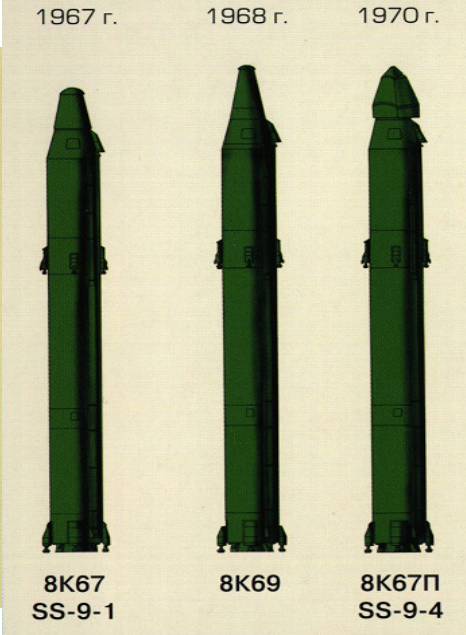
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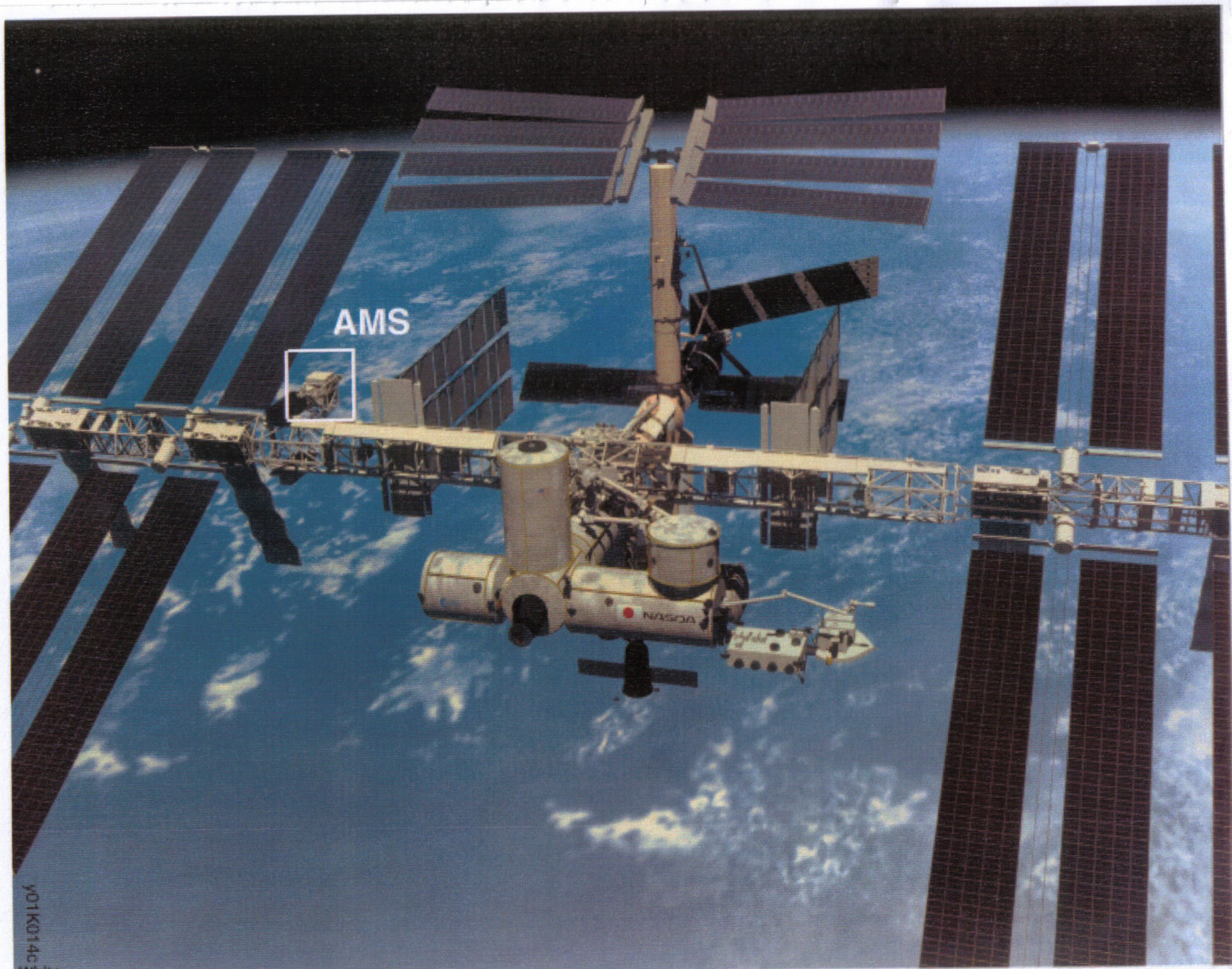
-finally to the Outer Space Treaty and creation of COPUOS (UN Committee on the Peaceful Uses of Outer Space)



From Sputnik to Lunar race

- 1961 (Gagarin - First man in space)
- Early 1960th (rapid development of manned flights, followed by Tereshkova flight)
- 1969 (N-1 superrocket failure)
- 1960eth (Lunar robotic missions, Lunokhod and Lunar sample return / L-1 to L-24)





AMS



NASDA

y01k014c

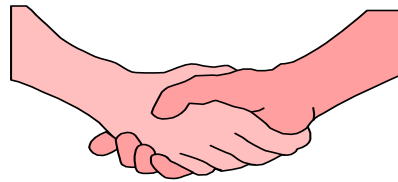
SPACE



Geopolitical



Economic



International
Co-operation



Societal



Market



Technology

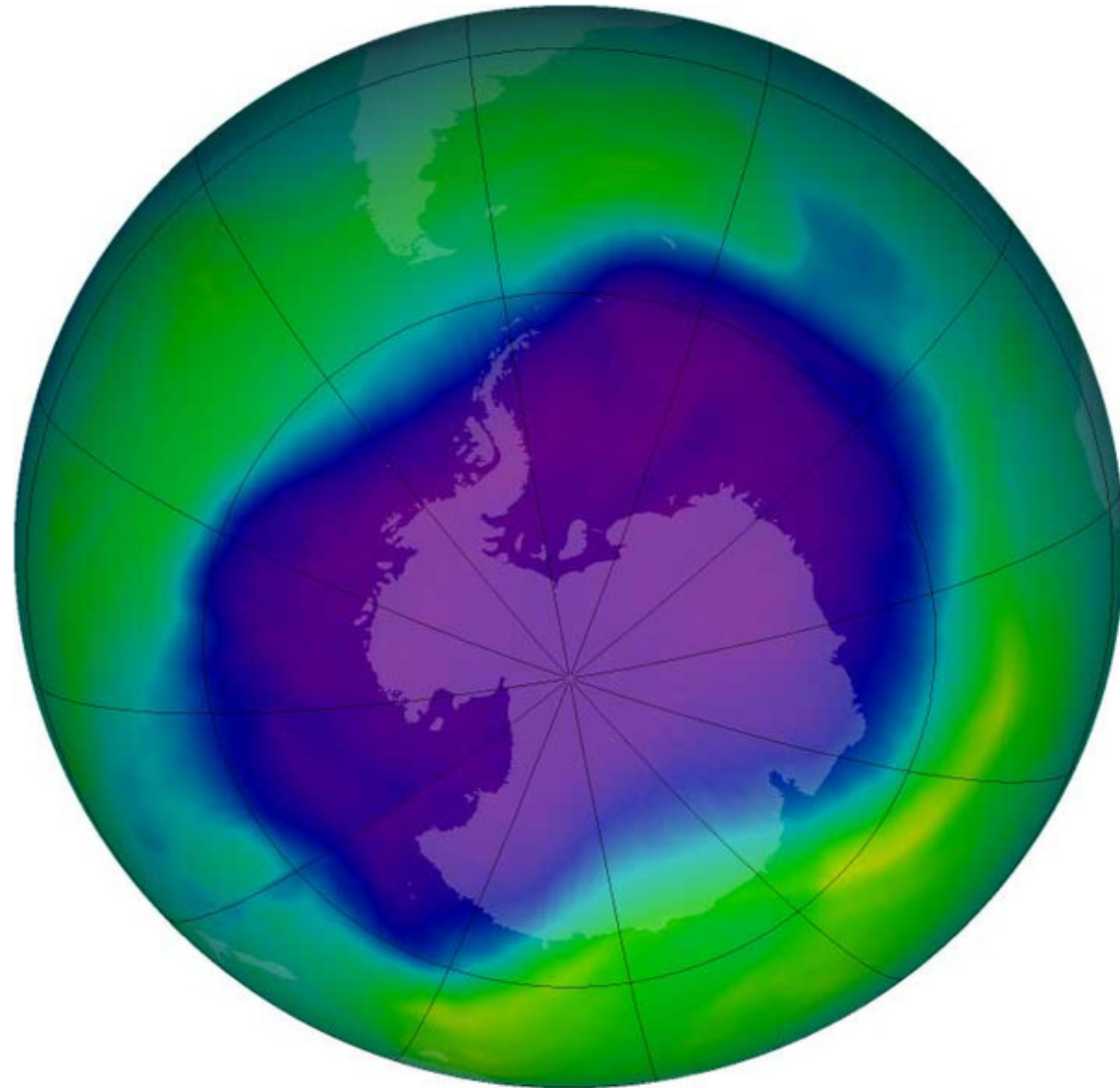
World Space activity in Global terms

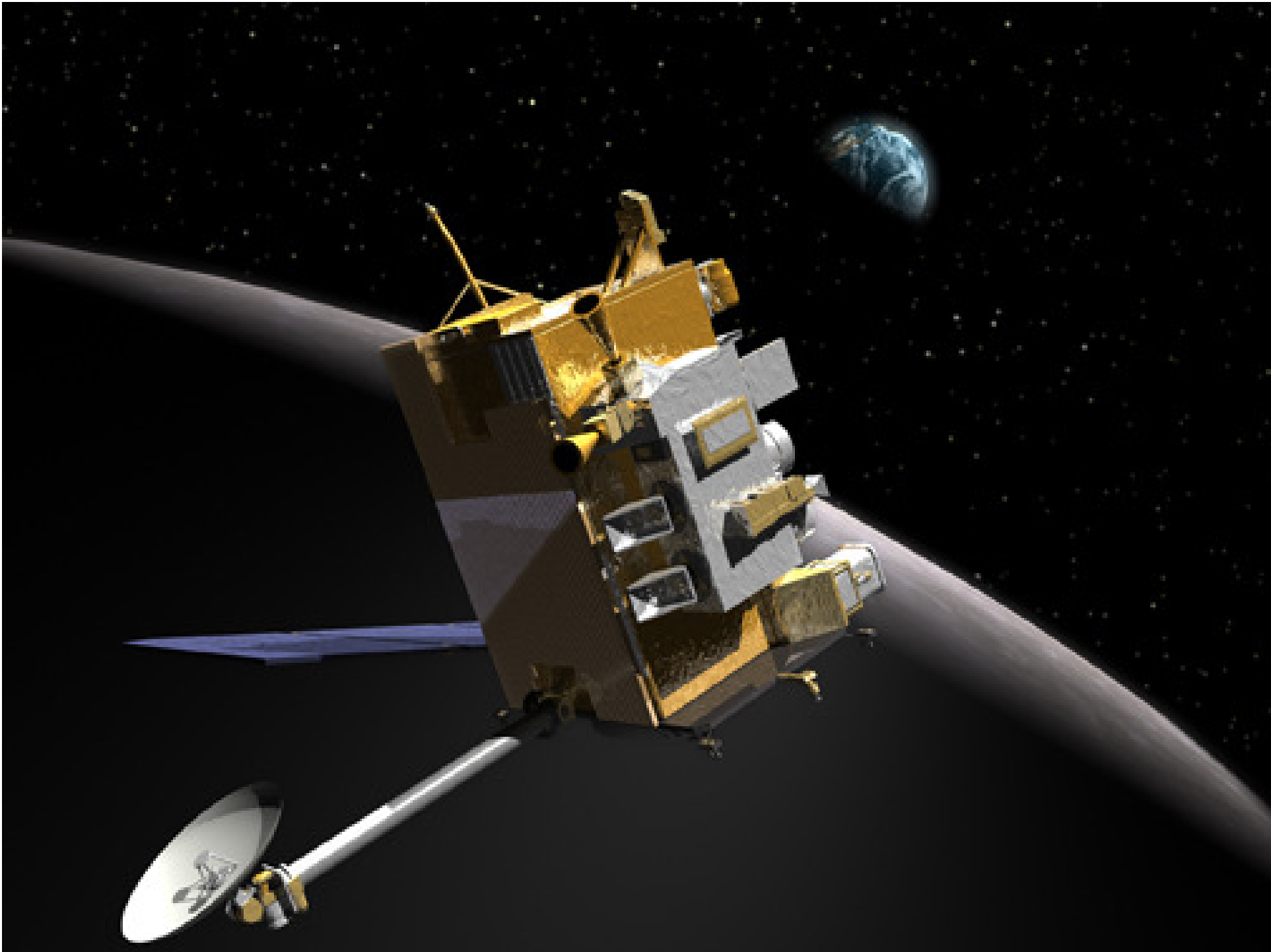
World economic activity US \$ 45 x 10¹²

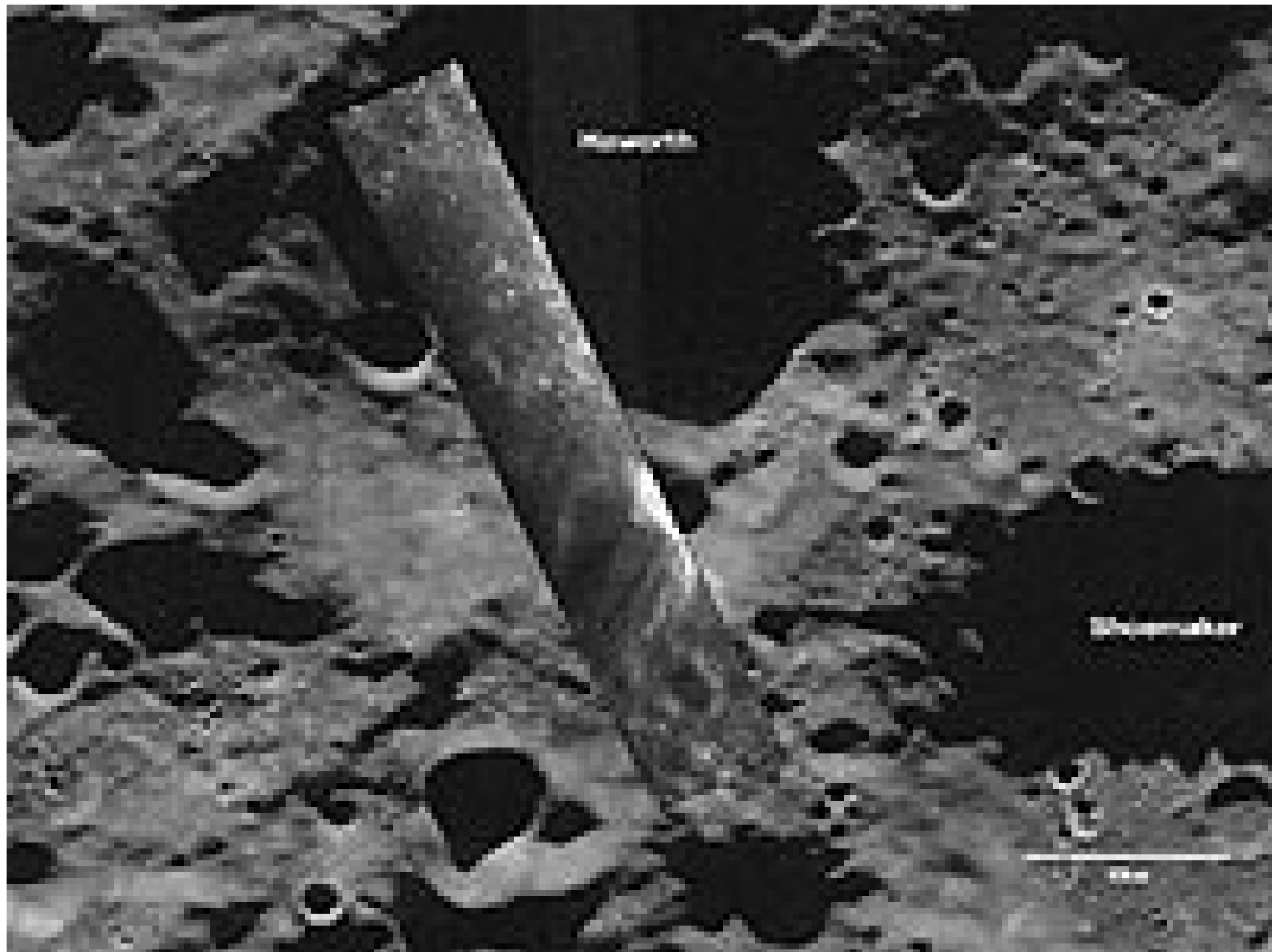
Space Economic activity US \$ 100 x10⁹

\$1 in \$450 of economic activity spent on space

Ozone Hole

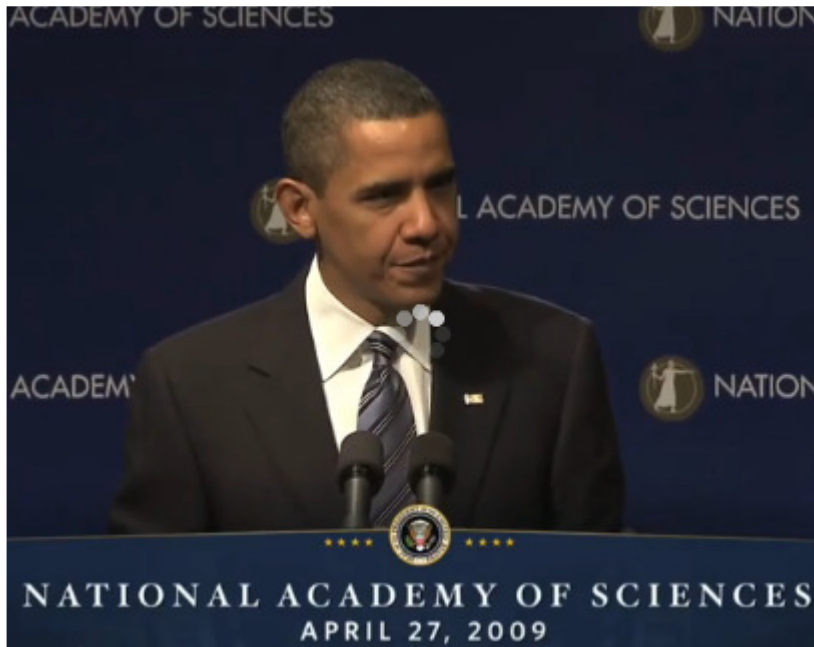






The Key Ingredients of GNSS

- Access to Space (opened by Sputnik)
 - Accurate Clocks (provided by Atomic Clocks /Quantum Physics)
- and
- Microprocessors (Computer Revolution)
 - Algorithms to use them (provided by the Relativity Theory: Doppler Effect...)



Addressing the Annual Meeting of US National Academy of Sciences

“I would like to begin today with a story of a previous visitor who also addressed this august body. In April of 1921, Albert Einstein visited the United States for the first time...

... He reportedly said: “I have just got a new theory of eternity”

**President Obama,
Addressing the Annual Meeting
of US National Academy of Sciences,
April 27,2009 Washington DC
(cont.)**

“The calculations of today’s GPS
Satellites are based on the
equations that Einstein put to
paper more than a century ago”

- Location- *determining a basic position.*
- Navigation - *getting from one location to another.*
- Tracking - *monitoring the movement of people and things.*
- Mapping- *creating maps.*
- Timing - *providing precise timing.*

Special Upgrades on top of standard GNSS capabilities

- **The Differential GPs**
- The Carrier-Phase Receiver Systems

10 Meters  ***mm_s***

U.S. Use of Space: Air-to-Ground Munitions (approximate; excluding HARM)

KTO, 1991 (Desert Storm): 37 Days	Unguided	245,000	92%
	Laser/EO-guided	20,450	8%
Serbia, 1999 (Allied Force): 78 Days	Unguided	16,000	66%
	Laser/EO-guided	7,000	31%
	GPS-guided	700	3%
Afghanistan, 01-02 (Enduring Freedom)	Unguided	9,000	41%
	Laser/EO-guided	6,000	27%
	GPS-guided	7,000	32%
Iraq, 03 (Iraqi Freedom)	Unguided	9,251	32%
	Guided	19,948	68%

Versatility of GNSS

- [GPS pet tracker](#) (GPS Pet Collar)

GPS Child Tracker

- tracking of elderly members of family (and Alzheimer patients)
-
- emergency road side assistance
- Find a good Italian restaurant near your movie theatre
- Track your luggage, laptops, and anything of importance while traveling
- [GPS Spouse Tracking](#)
(Monitoring the Spouses Activities)