Benchmark II

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Introduction

In Benchmark I have found out main space definitions, possible motivations, that drive people interest into space, researched the history of man in space and developed an understanding of possibility uses of space. So in this work I am going to get a deeper insight into man's interactions in space, research some kinds of space programs and countries that had or are having them. Moreover I want to analyze space events, treaties and agreements that control people's action in space and international organizations that monitor possible military activities in space. For this I am going to make a special database to compare countries by the point of view of space interactions.

The database of space programs, treaties and races

I have done the database of space programs, treaties and races. I choose this type of work because with the help of the table we can easily imagine what happened in space in the past, what space programs exist now and are planned for the future, what countries have opportunities of exploration and using space. So we can compare all space events and draw some conclusions.

Country (agency)	*Events*				
	Projects			*Treaties*	*Races*
	Past	*Present*	*Future*		
the USA	Explorer 1 (1958)	Project Prometheus (2003 – 2010)	Project Constellation (2030)	1963: Comprehensive Test Ban Treaty	The Space Race between the United States and the Soviet Union (1957-1975)
	Pioneer program (1958-1978)	Discovery Program (2006-2008)	Mars Scout Program	1967: the Outer Space Treaty	The Second Space Race
	Project Apollo (1961–1974)	New Millennium program		1968: Rescue Agreement1992: WhiteHouseBriefing-UkraineTreaty	
	Ranger program (1961-1965)	Space Shuttle program		1972: The Liability Convention	
	Mariner (1962-1973)	**GEOTAIL**		1975: Convention on Registration of Objects Launched into Outer	

				Space	
	Explorer (1963-1973)	**AKEBONO**		1987:Missile Technology Control Regime	
	Surveyor (1966-1968)	**Suzaku**		1992: WhiteHouseBriefing-UkraineTreaty	
	Lunar Orbiter program(1966 -1967)			1991:Strategic Arms Reduction Treaty	
	Skylab (1973 -1979)			2000: SPT	
	Viking program (1975)				
	Voyager(1977)				
	AMPTE (1984)				
Russia (USSR)	Sputnik (late 1950s)	Buran program (since 1976)		1963: Comprehensive Test Ban Treaty	The Space Race between the United States and the Soviet Union (1957-1975)
	Luna (1959-1976)	**Kipler** (2005-2015)		1967: the Outer Space Treaty	The Second Space Race
	Venera (1961 - 1983)	Soyuz programme (since early 1960s		1972: The Liability Convention	

	Zond (1964-1975)	**AKEBONO**		1975: Convention on Registration of Objects Launched into Outer Space	
	Voskhod programme (1964-1965)			1968: Rescue Agreement	
	Mars probe program(early 1970s)			1991:Strategic Arms Reduction Treaty	
	Salyut program(1970s)				
	The Vega program(1980s)				
	Phobos (1988)				
ESA	Cos-B (1975-1972)	Aurora Programme (since 2005)	BepiColombo(2013)	2005: ESA-ISRO	The Second Space Race
	Giotto (1985)	The Living Planet Programme		1975: Convention on Registration of Objects Launched into Outer Space	
		Kipler (2005-2015)		1963: Comprehensive Test Ban Treaty	
		AKEBONO			
		AKARI			

Japan	Sagikake (1985)	Space Radiation Environment Measurement Program	Japan Space Program	1975: Convention on Registration of Objects Launched into Outer Space	The Second Space Race
	Suisei (1985)	Hayabusa mission(2003-2010)	BepiColombo(2013)	1963: Comprehensive Test Ban Treaty	
	Early H-IIA missions (2003-2005)	Earth Observation Program (2006-2010)			
		AKEBONO			
		Suzaku			
		AKARI			
India		**GEOTAIL**		2005: ESA-ISRO	The Second Space Race
		Chandrayaan(2004-2008)		1963: Comprehensive Test Ban Treaty	
				2000:SPT[60]	
				1975: Convention on Registration of Objects Launched into Outer Space	
				1979: Moon Agreement	

United Kingdom	**AMPTE** (1984)	the British space programme		1963: Comprehensive Test Ban Treaty	
				1967: the Outer Space Treaty	
				1972: The Liability Convention	
				1975: Convention on Registration of Objects Launched into Outer Space	
				1968: Rescue Agreement	
China		The space program of the People's Republic of China (PRC) (since 1956)		1972: The Liability Convention	The Second Space Race
		CLEP		1975: Convention on Registration of Objects Launched into Outer Space	
				1963: Comprehensive Test Ban Treaty	

As a result of my investigation, now I'm able to compare the space activity of the USA, Russia, Great Britain, India, Japan, China and the European Union. I find out twelve American space programs, nine USSR programs, two European ones, three Japan and an English program. Some of them were done in cooperation. I am in the know that in the XX century when the space age was at start the USA and USSR had most of activities in space.

Also I researched programs which exist now. Today Russia has four existing programs, America has 7 ones. In the XXI century Japan began deep exploring and using space. There are six space programs in Japan. Taking into consideration fast development of Japan's science this country will be able to become a serious rival to America and Russia in space in the nearest future. Moreover both India and China have two their own space programs. Europe has their interests in space and there are four programs now. A big space program exists even in Great Britain.

If we research future plans of the USA, Russia, Great Britain, India, Japan, China and the European Union we will see that they will go on exploring and using the space. As I have found out the USA is planning two space programs for the future. Russia will continue realizing programs that exist now. Europe wants to organize a space program in the future. And certainly Japan has two programs for the future.

I find out that the USA, Britain, Russia, India, Japan, China and the European Union signed in sum ten different treaties and agreements that control man's activities in space.

I have found out that the XX century was the time of Space Race between USSR and the USA; the XXI century is a new period of space age, it is the Second Space Race and the United States, China, the European Union, Russia, Japan, and India take part in it.So with the help of database I compared, in my view, the most powerful countries. Now, if you press Ctrl and click on the program simultaneously you can find out about the programs.

Space programs that were done in the past

Firstly, I would like to explore space programs that have been done in the past. Everybody knows when the space age started in part due to the Cold War between USA and USSR only these countries were exploring and using the space. So if we research space programs of 1950-1970s we will see the USA and USSR ones. But then some other counties started space exploring and many more programs appeared.

Explorer 1 (1958) (USA)

The Explorer Project was initiated by the U.S. Army Ballistic Missile agency. Its goals were to examine cosmic rays, temperature, and meteorological impacts in space. It also had a miniature Geiger counter which discovered belts of radiation. The next 7 satellites in the Explorer project did the same. Explorers 8, 20, 22, and 27 measured the density of electrons in the Earth's ionosphere.[1]

Pioneer program (1958-1978) (USA)

The US Pioneer program of unmanned space missions was designed for planetary exploration. There were a number of such missions in the program, but the most notable were Pioneer 10 and Pioneer 11, which explored the outer planets and left the solar system. Both carry a golden plaque, depicting a man and a woman and information about the origin and the creators of the probes, should any extraterrestrials find them someday.[2]

Project Apollo (1961–1974) (USA)

Project Apollo was a series of human spaceflight missions undertaken by the United States of America (NASA). They used the Apollo spacecraft and Saturn launch vehicle, conducted during the years 1961–1974. “It was devoted to the goal (in U.S. President John F. Kennedy's famous words) of "landing a man on the Moon and returning him safely to the Earth" within the decade of the 1960s.” This goal was achieved with the Apollo 11 mission in July 1969.

"The program continued into the early 1970s to carry out the initial hands-on scientific exploration of the Moon, with a total of six successful landings. As of 2007, there has not been any further human spaceflight beyond low earth orbit. The later Skylab program and the joint American-Soviet Apollo-Soyuz Test Project used equipment originally produced for Apollo, and are often considered to be part of the overall program.[3]

Ranger program (1961-1965) (USA)

The Ranger program was a series of unmanned space missions by the United States in the 1960s whose objective was to obtain the first close-up images of the surface of the Moon. The Ranger spacecraft were designed to collide with the lunar surface, returning imagery until they were destroyed upon impact.

Total research, development, launch, and support costs for the Ranger series of spacecraft (Rangers 1 through 9) was approximately $170 million.[4]

Mariner (1962-1973) (USA)

The Mariner program was a series of unmanned interplanetary probes designed to investigate Mars, Venus and Mercury. The program was conducted by the American space agency NASA, and included a number of firsts, including the first planetary flyby, the first planetary orbiter, and the first gravity assist.

Mariner 10 is only one spacecraft which took photos of Mercury in short distance. Mariner 4 took photos of Mars for the first time. Mariner 9 became unique artificial satellite of Mars.[5]

Explorer (1963-1973) (USA)

The Explorer projects: 18, 21, 28, 33, 34, 35, 41, 43, 47, and 50 were all sent to monitor the interplanetary environment and were placed as far out as the moon's orbit. They successfully monitored changes in the solar wind and the Earth's magneto tail. Explorer 38 and 39 were designed and released to listen to galactic radio sources(Explorer 38 was interfered with by Earth's radio waves and so Explorer 39 went out as far as the moon). Explorer 42, 43, and 53 mapped the sky at X-ray and gamma ray wavelengths (Explorer 42 was the first NASA satellite launched from another country [San Marco]. It was launched from a Scout rocket.)[6]

Surveyor (1966-1968) (USA)

These probes were developed by NASA's Jet Propulsion Laboratory. All seven craft were built by Hughes Aircraft. The first satellite landed safely on the surface of the moon in the Ocean of Storms. The second failed but all the rest were successful. They were able to take a 3601/4 panoramic view of the lunar surface. Surveyor 3 made the first soil sample of the moon. The Surveyor mission confirmed that a manned mission to the moon was possible. Surveyor 6 even fired its soft landing engines and hopped on the surface to test its strength.[7]

Lunar Orbiter program (1966 -1967) (USA)

The Lunar Orbiter program was a series of five unpiloted Lunar orbiter missions launched by the United States in 1966 through 1967 with the purpose of mapping the lunar surface before the Apollo landings. All five missions were successful, and 99 % of the Moon was photographed with a resolution of 60 m or better. The first three missions were dedicated to imaging 20 potential lunar landing sites, selected based on Earth based observations. These were flown at low inclination orbits. The fourth and fifth missions were devoted to broader scientific objectives and were flown in high altitude polar orbits. Lunar Orbiter 4 photographed the entire nearside and 95 % of the farside, and Lunar Orbiter 5 completed the farside coverage and acquired medium (20 m) and high (2 m) resolution images of 36 pre-selected areas.[8]

Skylab (1973 -1979) (USA)

Skylab was the first space station the United States launched into orbit. The 75 metric tones station was in Earth orbit from 1973 to 1979, and was visited by crews three times, in 1973 and 1974. It included a laboratory for studying the effects of microgravity, and a solar observatory.

The original genesis of the Skylab project is difficult to pinpoint due to the number of different proposals floated from various NASA centers.[9]

Viking program (1975) (USA)

This NASA mission was designed to investigate the possibility of any possible life on Mars. In order that they do not mistake Earth Bacteria for Martian life, the crafts were sterilized at 112 degrees Celsius. Along with the TV cameras, the

Viking craft were also equipped with a spectrometer called an Infra-red Thermal Mapper used to measure the temperature profile of the surface and atmosphere and the Mars Atmosphere Water detector to search for water vapor in the Martian Atmosphere. The lander carried 11 experiments that would be carried out but the soil analysis of the Martian soil was deemed inconclusive. The probes were powered by Radioisotope Thermonuclear Generators. But the results of the Viking tests were very helpful. The TV pictures show the plain-like surface of the planet, covered by small volcanic rocks and unmoved sand dunes. [10]

Voyager (1977) (USA)

"One of the most successful space explorations ever, the Voyager project was created to use the gravitational pull of other planets to visit the outer planets. The first project, because of cutbacks, only visited Jupiter and Saturn. But the second had the calculations to reach Uranus and Neptune. The craft was built by the Jet Propulsion Laboratory (JPL)".[11]

AMPTE (1984) (USA, Great Britain, Germany)

This project was a cooperation between NASA, Great Britain, and Germany. Launched by a Delta rocket, it carried one satellite from each country and was designed to watch how barium and lithium ions affect the Earth's magnetic field. The spacecraft observed how quickly the barium atoms were ionized by the ultraviolet portion of the sun's light.[12]

Sputnik program (USSR)

The Sputnik program was a series of unmanned space missions launched by the Soviet Union in the late 1950s to demonstrate the viability of artificial satellites. The Russian name "□□□□□□□" means literally "traveling companion", i.e. "satellite".

''All Sputniks were carried to orbit by the R-7 launch vehicle, originally designed to carry nuclear warheads. There were launched 41 Sputnik satellites''.[13]

Luna (1959-1976) (USSR)

This Soviet project was designed to travel to the moon and take pictures from its surface. This project established many firsts in lunar travel. It was the first spacecraft to hit the Moon, the first to travel behind and take pictures of the moons far side, make a soft landing on the moon, and to move an remote controlled rover on the Moon's surface. Although it missed its original purpose, Luna 1 became the first manmade object to orbit the Sun.[14]

Venera (1961 - 1983) (USSR)

These 16 Soviet missions were aimed towards Venus and consequently established many firsts. Venera 4 was the first probe to penetrate the Venusian atmosphere, Venera 8 had the first successful Landing on the surface of Venus, Venera 9 was the first craft to Orbit the planet, Venera 13 was the first craft to return color TV pictures of the Venusian surface and soil analysis, and Venera 16 was the first radar mapping of the planet. The Venera mission revealed much of the Venusian surface.

"Among the other results, probes of the series became the first man-made devices to enter the atmosphere of another planet, to make a soft landing on another planet, to return images from the planetary surface and to perform high-resolution radar mapping studies of Venus. So, the entire series could be considered as highly successful. Unfortunately, while Venus' orbit is closer to Earth than Mars, its surface conditions were far more extreme, which often meant that the probes did not survive long".[15]

Zond (1964-1975) (USSR)

Zond (meaning "probe") was the name given to two series of Soviet unmanned space missions from 1964 to 1970 to gather information about nearby planets and test spacecraft. The spacecraft itself was stripped-down variant of the manned Soyuz craft, consisting of the service and descent modules, but lacking the orbital module.

The first three missions were based on the model 3MV planetary probe, intended to explore Venus and Mars. After two failures, Zond 3 was sent on a test mission, photographing the far side of the Moon (only the second spacecraft to do so) and continuing out to the orbit of Mars in order to test telemetry and spacecraft systems.[16]

Voskhod programme (1964-1965) (USSR)

The Voskhod programme (translated as "rising") was a Soviet human spaceflight project. Voskhod development was both a follow-on to the Vostok programme, and a recycling of components left over from that programme's cancellation following its first six flights. The two missions flown used the Voskhod spacecraft and rocket.

The Voskhod flights were, in retrospect, merely aimed at making Soviet "firsts" in space exploration. While these missions were the goal of the Politburo's influence on the efforts of the

"Soviet space programme, they were achieved by significantly reducing safety and reliability. While the Vostok program was dedicated more towards understanding the effects of space travel and microgravity on the human body, Voskhod's two flights were more aimed towards spectacular "firsts". Although achieving the first EVA ("spacewalk") became the main success of the program, beating the U.S. Gemini program to put the first multi-person crew in orbit was the objective that initially motivated the program. Once both goals were realized, the program was abandoned. This followed the change in Soviet leadership, which was less concerned about stunt and prestige flights, and allowed the Soviet designers to concentrate on the Soyuz program."[17]

Mars probe program (early 1970s) (USSR)

The Mars program was a series of Mars unmanned landers and orbiters launched by the Soviet Union in the early 1970s.

Mars 1 was launched in 1962 but failed en route to Mars. Two other Soviet launches at around the same time, Mars 1962A and Mars 1962B, were likely similar or identical spacecraft but both of these failed during launch and did not leave Earth orbit.

The Mars 2 and Mars 3 missions consisted of identical spacecraft, each with an orbiter and an attached lander; they were the first human artifacts to touch down on Mars. Mars 4, 5, 6, and 7 comprised an associated group of Soviet spacecraft launched towards Mars in July and August of 1973. Mars 96 was an orbiter launched in 1996 by Russia and not directly related to the Soviet series of probes.[18]

Salyut program(1970s) (USSR)

The Salyut (Russian: □□□□□, Salute or Firework) program was a series of space stations launched by the Soviet Union in the 1970s. The Salyuts were all relatively simple structures consisting of a single main module placed into orbit in a single launch. The program was originally designated the DOS 7-K program, with each Salyut station receiving a designation.[19]

The Vega program (1980s)(USSR)

The Vega program were a series of Venus missions which also took advantage of the appearance of Comet Halley in 1986. Vega 1 and Vega 2 were unmanned spacecraft launched by the Soviet Union in December 1984. They had a two part mission to investigate Venus and also flyby Comet Halley.

The flyby of Comet Halley had been a late mission change in the Venera program following on from the cancellation of the US Halley mission in 1981. A later Venera mission was cancelled and the Venus part of the Vega 1 mission was reduced. Because of this, the craft was designated Vega, a contraction of "Venera" and "Gallei" (Russian words for "Venus" and "Halley", respectively). The spacecraft design was based on the previous Venera 9 and Venera 10 missions. The two spacecraft were launched on December 15 and December 21, 1984, respectively.[20]

Phobos (1988) (USSR)

These two Soviet Satellites were claimed to be the next generation in space exploration. Its mission was to orbit Mars, closely pass its larger moon, Phobos, and continue to investigate the planet and solar wind environment. Each of the crafts returned data about the solar wind, but in both satellites, communication was lost.[21]

Cos-B (1975-1972) (ESA)

It was the first European Space* Agency mission to study gamma-ray sources. The mission consisted of a satellite containing X-ray and gamma-ray detectors, which was launched by NASA on behalf of the ESA on August 9, 1975. The mission was completed on April 25, 1982, after the satellite had been operational for more than 6.5 years, four years longer than planned. Scientific results included the 2CG Catalogue listing around 25 gamma ray sources and a map of the Milky Way. The satellite also observed the Cygnus X-3 pulsar.[22]

**The European Space Agency (ESA), established in 1975, is an inter-governmental organization dedicated to the exploration of space, currently with 17 member states. Its headquarters are in Paris, France. ESA has a staff (excluding sub-contractors and national space agencies) of about 1,900 with an annual budget of about €3 billion in 2006.*

Its members: members: Austria, Luxembourg, Belgium, Netherlands, Denmark, Norway, Finland, Portugal, France, Spain, Germany, Sweden, Greece, Switzerland, Ireland, United Kingdom and Italy[23]

Giotto (1985) (ESA)

Headed by the European Space Agency, it was named after Giotto Di Bondane, a 14th century painter who painted a picture with a comet, now believed to be Halley's, that which it was going to examine. Its goal was to use its equipment: a TV camera, a photopolarimeter, 3 mass spectrometers, dust impact detectors to examine Halley's Comet in space. The satellite successfully documented the comet, but half its instruments were destroyed.[24]

Sagikake (1985) (Japan)

One of Japan's first space probes, Sagikake("Pioneer") was launched January 7 1985 from Kagoshima Space Center. Its purpose was to investigate the interaction of the solar wind and Halley's Comet. It discovered that the solar wind was disturbed by the comet as far away as 7 million km (4.4 million miles).[25]

Suisei (1985) (Japan)

Japan's second space probe, Suisei ("Comet") was launched in order to investigate the growth and decay of Halley's comet's corona and the interaction of the solar wind and the comet itself. It carried an ultraviolet imaging experiment to accomplish this. It was launched August 18, 1985. It reached within 94,000 miles of the comet's nucleus.[26]

Early H-IIA missions (2003-2005) (Japan)

Japan's first space mission under JAXA, an H-IIA rocket launch on November 29, 2003, ended in failure due to stress problems. After a 15 month hiatus, JAXA performed a successful launch of an H-IIA rocket from Tanegashima Space Center, placing a satellite into orbit on February 26, 2005.[27]

Having explored the space programs that were in the past I saw a lot of countries that had their interests and motivations in using space. By the XXI century Russia, USA, China, India and Europe have had their own or cooperative

space programs for different purposes such as making weather forecasts from space to carrying nuclear warheads, examining cosmic rays, temperature, and meteorological impacts in space, landing a man on the Moon, taking photos of other planets, studying the effects of microgravity and others. All investigations that were done in the past had a great value for the future: the development of space technologies gave a rise to the development of modern medicine, science, now we are able to use things and enjoy the products of space technologies in our everyday life.

Space programs that exist now

Programs that exist now differ from programs that were done in the past. In the modern world USA, Russia, China, Japan, European Union, India and Ukraine have space projects. Some of these countries have joint programs. In this part of my work I would like to speak about these programs.

Project Prometheus (2003 – 2010) (USA)

Project Prometheus was established in 2003 by NASA to develop nuclear-powered systems for long-duration space missions. "This is NASA's first serious foray into nuclear spacecraft propulsion since the cancellation of the NERVA project in 1972. However, as of 2005, the Project faces an uncertain future and is likely to be reduced to a low-level research effort. Its budget will shrink from $430 million in 2005 to only $100 million in 2006, $90 million of which is already being allocated to pay closeout costs on cancelled contracts.

NASA says the name Prometheus indicates its hopes of establishing a new tool for understanding nature and expanding capabilities for the exploration of the Solar System.

Due to their distance from the Sun, spacecraft exploring the outer planets are severely limited in that they cannot use solar power as a source of electrical energy for onboard instrumentation or for ion propulsion systems. Previous missions to the outer planets such as Voyager and Galileo probe have relied on radioisotope thermoelectric generators (RTG's) as their primary power source. Unlike RTG's which rely on heat produced by the natural decay of radioactive isotopes, Project Prometheus calls for the use of a small nuclear reactor as the primary power source."[28]

Discovery Program (2006-2008) (USA)

"NASA's Discovery Program is a series of lower-cost, highly focused scientific space missions. It was founded to implement NASA Administrator Daniel S. Goldin's vision of "faster, better, cheaper" planetary missions. Discovery missions differ from traditional NASA mission where targets and objectives are pre-specified, instead, these missions are proposed by any organization while costs are capped. Proposing organizations may be teams of people in the industry, small businesses, government laboratories, and universities, and led by a Principal Investigator (PI). Proposals are then selected through a

competitive peer review process. Development time of missions from start to launch cannot be longer than 36 months. Currently, for the 2006 Announcement of Opportunity, the cost is capped at $425 million.

NASA has shortlisted on October 30, 2006 three concept studies for a new selection of Discovery missions. Also selected for further study are three missions of opportunity that would make new use of two NASA spacecraft that have completed their primary objectives, Deep Impact and Stardust."[29]

New Millennium program (USA)

"NASA's New Millennium program is focused on engineering validation of new technologies for space applications. Past New Millennium missions include: Deep Space 1, standalone spacecraft testing solar electric propulsion, autonomous operation etc; successful mission 1998-2001 including comet and asteroid encounters; Deep Space 2, Mars surface penetrators flown with Mars Polar Lander in 1999; failed - Earth Observing 1, launched in 2000; successful - Space Technology 5, a cluster of three satellites investigating the Earth's magnetosphere launched in 2006. Earth Observing 2 was cancelled in 1998. Deep Space 4/Space Technology 4, also known as Champollion, was planned for launch in 2003 to orbit and land on comet Tempe l 1 and return a sample in 2010; it was cancelled in 1999."

USA is also planning some missions for the future. They want to observe the gravitational wave and the launch will be in 2009.[30]

Space Shuttle program (1960-2010) (USA)

"The program started in the late 1960s and has dominated NASA's manned operations since the mid-1970s. According to the Vision for Space Exploration, use of the Space Shuttle will be focused on completing assembly of the ISS by 2010, after which it will be retired from service, and eventually replaced by the new Orion spacecraft (now expected to be ready in about 2014).

The Shuttle program was formally launched on January 5, 1972, when President Nixon announced that NASA would proceed with the development of a reusable Space Shuttle system. The final design was less costly to build and less technically ambitious than earlier fully reusable designs. The initial design parameters included a larger external fuel tank, which would have been carried to orbit, where it could be used as a section of a space station, but this idea was killed due to budgetary and political considerations.

The first fully functional Shuttle Orbiter was the Columbia, built in Palmdale, California. It was delivered to Kennedy Space Center on March 25, 1979, and was first launched on April 12, 1981—the 20th anniversary of Yuri Gagarin's space

flight—with a crew of two.[32] Challenger was delivered to KSC in July 1982, Discovery in November 1983, and Atlantis in April 1985. Challenger was destroyed during ascent due to O-Ring failure on the right SRB on January 28, 1986, with the loss of all seven astronauts on board. Endeavour was built to replace Challenger (using spare parts originally intended for the other Orbiters) and delivered in May 1991; it was first launched a year later. Seventeen years after Challenger, Columbia was lost, with all seven crew members, during reentry on February 1, 2003, and has not been replaced. Out of five functional shuttle orbiters only three remain for use.

''Current and past Space Shuttle's applications include:

- Crew rotation and servicing of Mir and the ISS
- Manned servicing missions, such as to the Hubble Space Telescope (HST)
- Manned experiments in LEO
- Carry satellites with a booster''

The Space Shuttle program has been criticized for failing to achieve its promised cost and utility goals, as well as design, cost, management, and safety issues.

After both the Challenger disaster and the Columbia disaster, high profile boards convened to investigate the accidents with both committees returning praise and serious critiques to the program and NASA management. One of the most famous of these criticisms came from Nobel Prize winner Richard Feynman."[31.33]

GEOTAIL (India, USA)

This is a joint program of the Institute of Space and Astronautical Science (ISAS) of Japan and the National Aeronautics and Space Administration (NASA) of U.S.A. ISAS developed the spacecraft and provided about two thirds of the science instruments, while NASA provided the launch and about one third of the science instruments. The spacecraft is operated from ISAS but the telemetry is received by both agencies.[34]

AKEBONO (USA, Russia, Japan, ESA)

"This project, which involves Japan, the US, Europe and Russia, is named the International Solar Terrestrial Physics program (ISTP). AKEBONO, which conducts observations of phenomena related to the aurora, was launched in advance of

the ISTP program. With the objective of a general understanding of the flow of energy and matter from the sun to the earth's magnetosphere via the solar wind, 10 probes have been placed in the near-earth space environment to conduct comprehensive observations. Through coordinated observations in cooperation with the geomagnetism and aurora observation network, the satellite played a central role in solar-terrestrial observations on the eve of the ISTP observations, and continues to perform important observations together with the ISTP probes even after the ISTP program began."[35]

Suzaku (USA, Japan)

Suzaku is the fifth Japanese X-ray astronomy satellite. It was developed under Japan-US international collaboration and was launched on July 10, 2005, from JAXA Uchinoura Space Center.[36]

Buran program (since 1976) (Russia)

The Soviet reusable spacecraft program Buran (meaning "snowstorm" or "blizzard" in Russian) began in 1976 at TsAGI as a response to the United States Space Shuttle program. Soviet politicians were convinced that the Space Shuttle would be an effective military weapon since the U.S. Department of Defense took part in the project, and could pose a potential threat to the balance of power during the Cold War. The project was the largest and the most expensive in the history of Soviet space exploration.

Buran is partially similar to the NASA Space Shuttle, while many features differ.[37]

Kliper (2005-2015) (Russia. ESA)

Kipler in a possible interplanetary trans-Mars or trans-lunar configuration

In February 2004 FSA deputy director Nikolai Moiseyev told journalists that the Kliper project had been included in the Russian federal space program for 2005-15. At that point he announced that if the program is implemented successfully the first launch may even take place in five years' time. Kliper had been developed since 2000 and reportedly relied heavily on research studies as well as proposals for a small Russian lifting body spacecraft from the 1990s. Externally its design was comparable to the cancelled European minishuttle Hermes or the NASA study X-38. It was planned to be the successor to the veteran spacecraft Soyuz, which has been built in various modifications since 1961.

Russian Space Agency especially looked to Europe as ESA has become its major partner in space activities during the last years. In May 2005 rumours started in the press that Europe would join the Kliper project in a specially funded venture that would be part of the Aurora Programme.

Kliper is planned to be Russia's and probably also Europe's primary access route to the International Space Station.[38.39]

Soyuz programme (since early 1960s) (USSR)

The Soyuz human spaceflight program was initiated in the early 1960s as part of the manned lunar programme that was intended to put a Soviet cosmonaut on the Moon. The Soyuz spacecraft and the Soyuz launch vehicle are both part of this program. The name "Soyuz" means "Union" in Russian.

"The Moon objective was abandoned when technological problems meant that the US would reach the Moon first. Soyuz survived the demise of the manned lunar program in that it developed into a variety of projects (both military and civilian), mostly in conjunction with space stations."[40]

Aurora Programme (since 2005) (ESA)

"The Aurora Programme of the European Space Agency is an ambitious long term undertaking of manned and unmanned exploration of the Solar system, and particularly Mars, with the Moon being possible intermediate step.

The strategy called for a human expedition to Mars by 2030. Member states commit to participation for five-year periods (the first is 2005-2009), after which they can change their level of participation or pull out entirely.

The first decade is planned to focus on robotic missions."[41]

The Living Planet Programme (ESA)

"As a result, ESA's Living Planet Programme is comprised of two main components: a science and research element in the form of the Earth Explorer missions, and the Earth Watch element designed to facilitate the delivery of Earth Observation data for the eventual use in operational services.

As part of the Living Planet Programme, the Earth Explorer missions encompass a new strategy for observing the Earth from space where missions are designed to address critical and specific issues that have been raised by the science community whilst demonstrating breakthrough technology in observing techniques."[42]

AKARI (Japan, ESA)

AKARI (Previously known as ASTRO-F or IRIS - InfraRed Imaging Surveyor) is the second space mission for infrared astronomy in Japan.

AKARI will host an Open-time Program (OT) for pointing observations open to Japan, Korea, and ESA communities. 30% of pointing observation opportunities in phases 2 and 3 will be allocated to OT. ESA will receive 1/3 of the OT pointing opportunities.[43]

Space Radiation Environment Measurement Program (Japan)

The National Space Development Agency of Japan (NASDA) is undertaken to execute a Space Radiation Environment Measurement Program using a space shuttle. Its purpose is to "evaluate the effects of space radiation over the on-orbit environment inside a pressurized module (inside the spacecraft filled with the air of 1 barometric pressure, the same as the condition on the ground)."

A Real time Radiation Monitoring Device (RRMD) and a Bonner Ball Neutron Detector (BBND) will be flown on board a space shuttle which is to fly on the scheduled orbit of the International Space Station. A total of 4 mission flights have been planned for this program during the period between September 1996 and May 1998.[44]

Hayabusa mission(2003-2010) (Japan)

"On May 9, 2003, Hayabusa (meaning, Peregrine falcon), was launched from an M-V rocket. The goal of this mission is to collect samples from an asteroid. The craft was scheduled to rendezvous in November of 2005, and return to Earth with samples from the asteroid by July of 2007. It was confirmed that the spacecraft successfully landed on the asteroid on November 20, 2005, after some initial confusion regarding the incoming data. On November 26, 2005, Hayabusa succeeded in making a soft contact, but whether it gathered the samples or not is unknown. Hayabusa is slated to return to earth in 2010."[45]

Earth Observation Programme (2006-2010) (Japan)

In January 2006, JAXA successfully launched the Advanced Land Observation Satellite (ALOS/Daichi). Communication between ALOS and the ground station in Japan will be done through the Kodama Data Relay Satellite, which was launched

during 2002. This project is under intense pressure due to the shorter than expected life time of the ADEOS II (Midori) Earth Observation Mission.

Next funded earth observation mission is the GCOM earth observation programme as a successor to ADEOS II (Midori). To reduce the risk and for a longer observation time the mission will be split into smaller satellites. Altogether GCOM will be a series of six satellites. First launch, GCOM-W is scheduled for 2010 with the H-2A.[46.44]

Chandrayaan (2004-2008) (India)

Chandrayaan is an unmanned lunar mission by the Indian Space Research Organization. The mission includes a lunar orbiter as well as an impactor. The spacecraft will be launched by a modified version of the Polar Satellite Launch Vehicle.[47]

The British space programme (Britain)

Scientific interest in space travel existed in the United Kingdom prior to the Second World War, particularly amongst members of the British Interplanetary Society (founded in 1933) whose members included Sir Arthur C. Clarke, author and conceiver of the geostationary telecommunications satellite, who joined the BIS after World War II.

Britain has launched several rockets and satellites.

The official British government programme of British satellite launches was cancelled in the early 1970's. However, British participation in space continues through working with other space agencies.

With a possible funding of up to and around £600,000,000 or around $1bn, the U.K. could possibly send two unmanned spacecraft to the moon before the decade is out, showing the world how advanced British technology is and how it can compare with the ESA and even NASA. It is hoped that it will also advertise British industry.[48]

The space program of the People's Republic of China (PRC) (since 1956) (China)

The space program of the People's Republic of China (PRC) began in 1956 with the cooperation of the USSR and continued as an indigenous nuclear deterrent program after the Sino-Soviet split in 1960. The Chinese space program was initiated at the behest of the Central Military Commission for fulfilling national defence needs. The potential military utility of space was the central reason for China embarking on its national space program since 1956. The program was aimed at

developing China's aviation, guided missiles, rockets and missile defence needs. PRC's space program has several goals. ''The China National Space Administration policy white paper lists short term goals as:

- build a long term earth observation system
- set up an independent satellite telecommunications network
- establish an independent satellite navigation and positioning system
- provide commercial launch services
- set up a remote sensing system
- study space science such as microgravity, space materials, life sciences, and astronomy
- plan for exploration of the moon
- improve their standing in the world of space science
- establish a manned space station.
- manned missions to the moon
- establish a manned lunar base. ''[49]
-

CLEP (China)

''Chinese Lunar Exploration Program (CLEP) will bring soil back to Earth from Phobos, one of Mars two moons, also collect samples on Mars.''[50]

So, we see modern man's interest of space. In their programs countries want to engine validation of new technologies for space applications, carry satellites, explore other planets, set up an independent satellite telecommunications network, establish an independent satellite navigation and positioning system, make manned missions to the moon, put people to the moon and many more goals that they want to achieve. I believe that now they are trying to investigate the territory of space for the further use of it. The territory of our planet is becoming polluted, overcrowded, scientists' prognoses say about the

natural disasters and catastrophes that may happen in the nearest future. So, I guess, the countries are looking for another place to leave for, when it will come to the end.

Space programs that may be in the future

The mankind is developing quickly. With new years new interests are coming. All countries that were signed in that part of my work have space plans for the future. They all want to go on the exploration of space.

Project Constellation (2030) (USA)

Project Constellation is NASA's current plan for space exploration as of August 2006. It consists of a family of new spacecraft, launchers and associated hardware that allow for a variety of missions, from Space Station resupply, to lunar landings. Most of the Constellation hardware is based on systems originally developed for the Space Shuttle.

"The program's vehicle concept can be broken down into three parts: The Orion Crew & Service Modules, the Lunar Surface Access Module, and the launch vehicles (LV). The launch vehicles proposed for use in the program include the unmanned Ares V (for launch of the Earth Departure Stage and either the LSAM or cargo), the manned Ares I LV (for launch of the Orion spacecraft), and the Ares IV, which combines the functions of the two."[51]

Mars Scout Program (USA)

During recent months, NASA has been developing a long-term Mars exploration program that charts a course for the next two decades.

"The Mars Scout Program is a new NASA program of small, low-cost missions to Mars, selected from innovative proposals by the scientific community. The first planned mission in this program is "Phoenix", a lander originally intended for the cancelled Mars Surveyor mission. Phoenix is scheduled to be launched during August of 2007, and will land on the icy northern pole of the planet."

The second set of Scout missions are under review and projected to launch in 2011.[53]

BepiColombo (2013) (ESA, Japan)

BepiColombo is a joint Cornerstone mission of the European Space Agency (ESA) and the Japan Aerospace Exploration Agency (JAXA) to the planet Mercury. The mission is still in the planning stages so changes to the current description are

likely over the next few years. Due to money problems and technological difficulties the lander portion of the mission (The Mercury Surface Element, or MSE) was cancelled.

The mission involves two components: the Mercury Planetary Orbiter (MPO) build by ESA and the Mercury Magnetospheric Orbiter (MMO) build by JAXA. The two components are planned to be launched together on a Soyuz-Fregat launch vehicle in August 2013. "The spacecraft will have a six year interplanetary cruise to Mercury using solar-electric propulsion and gravity assists from the Moon, Earth, Venus and Mercury.

BepiColombo is named for Giuseppe (Bepi) Colombo (1920-1984), scientist, mathematician and engineer at the University of Padua, Italy, who developed the gravity-assist maneuver commonly used by planetary probes today. He helped NASA devise the trajectory of Mariner 10, the only spacecraft having encountered Mercury till today, exploiting this maneuver for the first time around Venus."[54]

Japan Space Program – This country, as it is written in mass media, "has set a goal of constructing a manned lunar base in 2030". [55]

Japan is going to launch a satellite into lunar orbit next year, the astronauts will be sent to the moon by 2020 and they will stars constructing a base for the people to arrive.

We can see there are not a lot of space programs for the future. Most programs that exist now are going to be in the future. I am sure people will go on researching the space, finding new ways of its using and maybe they will find a planet with creatures alive or another place where a man will be able to live. Also in the nearest future tourist missions in space may take place.

The international treaties, agreements and conventions dealing with space

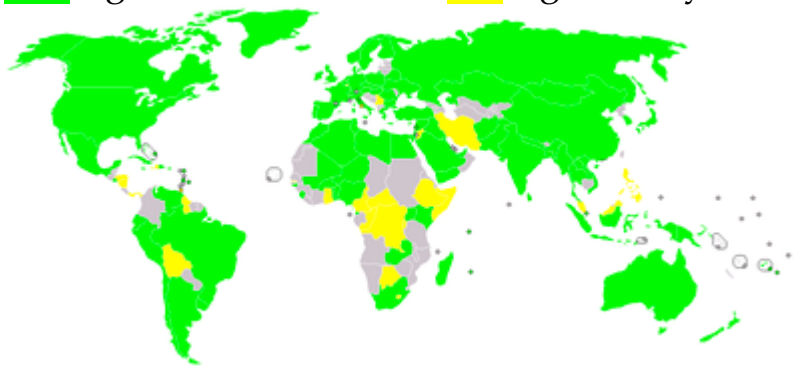
Now I am going to examine treaties, agreements and conventions dealing with space from perspective of the countries and programs that I identified before.

The Outer Space Treaty (1963)
(The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies)

It is one the most important space treaty in the history of mankind. It requires countries that signed it to authorize and supervise national space activities, including the activities of non-governmental entities such as commercial and non-profit organizations.

The Outer Space Treaty bans placing nuclear weapons or any other weapons of mass destruction in orbit of Earth, installing them on the Moon or any other celestial body. It limits the use of the Moon and other celestial bodies to peaceful purposes and prohibits their use for testing weapons of any kind, conducting military maneuvers, or establishing military bases, installations, and fortifications

signed and ratified signed only



So we can see that most of countries signed and ratified the Outer Space Treaty. [67]

Comprehensive Test Ban Treaty (1963)
(The Treaty Banning Nuclear Weapon Tests In The Atmosphere, In Outer Space And Under Water, often abbreviated as the Partial Test Ban Treaty (PTBT), Limited Test Ban Treaty (LTBT), or Nuclear Test Ban Treaty (NTBT))

It is a treaty that prohibits all test detonations of nuclear weapons except underground. It was developed both to slow the arms race (nuclear testing is necessary for continued nuclear weapon advancements), and to stop the excessive release of nuclear fallout into the planet's atmosphere.

Comprehensive Test Ban Treaty was opened for signature on August 5, 1963, and entered into force on October 10, 1963.

This treaty was signed by 113 countries such as Afghanistan, Antigua and Barbuda, Argentina, Armenia, Australia, Austria, The Bahamas, Bangladesh, Belgium, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burma, Canada, Central African Republic, Chad, Republic of China, Colombia, Democratic Republic of the Congo, Costa Rica, Côte d'Ivoire, Croatia, Cyprus, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Fiji, Finland, Gabon, The Gambia, Germany, Ghana, Greece, Guatemala, Honduras, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kenya, South Korea, Kuwait, Laos, Lebanon, Liberia, Luxembourg, Madagascar, Malawi, Malaysia, Malta, Mauritania, Mauritius, Mexico, Montenegro, Morocco, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Panama, Papua New Guinea, Peru, Philippines, Poland, Romania, Rwanda, Samoa, San Marino, Senegal, Serbia, Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, South Africa, Soviet Union, Spain, Sri Lanka, Sudan, Suriname, Swaziland, Sweden, Switzerland, Syria, Thailand, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Uganda, United Kingdom, United States, Venezuela, Zambia.

Also there are some countries that have signed, but not yet ratified - (17) Algeria, Burkina Faso, Burundi, Cameroon, Chile, Ethiopia, Haiti, Libya, Mali, Pakistan, Paraguay, Portugal, Somalia, Tanzania, Uruguay, Vietnam, Yemen

We see not all these countries have opportunities of using space but the all want to live in peaceul ann healthy world.[56]

The Liability Convention (1972)
(Convention on international liability for damage caused by space objects)

"The Liability Convention was considered and negotiated by the Legal subcommittee from 1963 to 1972.

Elaborating on Article 7 of the Outer Space Treaty, the Liabiity Convention provides that a launching State shall be absolutely liable to pay compensation for damage caused by its space objects on the surface of the Earth or to aircraft, and liable for damage due to its faults in space. The Convention also provides for procedures for the settlement of claims for damages".[57]

Missile Technology Control Regime(1987)
"It's a voluntary, non-treaty mechanism" that 33 countries have undertaken to observe the transfer of missiles.

Strategic Arms Reduction Treaty(1991)
It's a treaty between the USA and the Soviet Union that lessens the number of "strategic offensive arms". There were two treaties that regulated the lessening, they were called Start 1 and Start.2.

WhiteHouseBriefing-UkraineTreaty (1992)

It is a civil space cooperation agreement for work on science and related issues between the National Aeronautics and Space Administration and the Ukrainian National Space Agency.[58]

SPT (2000)

"The Space Preservation Treaty (SPT) is a proposed international treaty to ban space weapons. The Treaty would establish a peacekeeping agency to monitor outer space and enforce the ban on space-based weapons. Its companion, the Space Preservation Act, was introduced for the fourth time to the United States House of Representatives by Congressman Dennis Kucinich on May 18, 2005.

It should also be noted that no country has yet signed the Treaty, only the City of Berkeley and a few municipalities in Canada. At the end of Telegraph on the University of California Berkeley Campus there is a "space-based weapons-free zone""[59]

Convention on Registration of Objects Launched into Outer Space (1975)

Under this convention countries must register objects launched into outer space. Under these arrangements information has been received from Algeria, Argentina, Australia, Brazil, Canada, China, Chile, Czech Republic, France, Germany, Greece, India, Israel, Italy, Japan, Luxembourg, Malaysia, Mexico, Nigeria, Pakistan, Republic of Korea, Russian Federation, Spain, Sweden, Turkey, Ukraine, United Kingdom of Great Britain and Northern Ireland and the United States of America as well as from the European Space Agency (ESA) and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT).[60]

Treaty between ESA and ISRO (2005)

"On 17 March, 2005 the ESA Council, at its meeting in Paris, unanimously approved a co-operation agreement between ESA and the Indian Space Research Organisation (ISRO) for India's first Moon mission, Chandrayaan-1.

Under the agreement Europe will coordinate and support the provision of three instruments: CIXS-2, the Chandrayaan-1 Imaging X-Ray Spectrometer; SARA, a Sub-keV Atom Relecting Analyzer; and SIR-2, a Near-Infrared Spectrometer. It will also support the hardware for the High-Energy X-ray Spectrometer (HEX). Direct ESA in-kind contributions are also foreseen under this historical agreement. In return, all data resulting from the instruments will be made immediately available to ESA Member States through ESA."[61]

Moon Agreement (1979)

(The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies)

It is an international treaty that turns jurisdiction of all heavenly bodies (including the orbits around such bodies) over to the international community.

The treaty makes a declaration that the moon should be used for the benefit of all states and all peoples of the international community. It also expresses a desire to prevent the moon from becoming a source of international conflict.

As of January 1, 2006, it has been ratified by only Australia, Austria, Belgium, Chile, Kazakhstan, Mexico, Morocco, Netherlands, Pakistan, Peru, Philippines, and Uruguay. France, Guatemala, India, and Romania have signed but have not yet ratified it.[1] As it is unratified by any major space-faring powers and unsigned by most of them, it is of no direct relevance to current space activities.[62]

Rescue Agreement (1968)
(Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space)

The Rescue Agreement was considered and negotiated by the Legal Subcommittee from 1962 to 1967

The Agreement, elaborating on elements of articles 5 and 8 of the Outer Space Treaty, provides that States shall take all possible steps to rescue and assist astronauts in distress and promptly return them to the launching State, and that Staes shall, upon request, provide assistance to launching States in recovering space objects that return to Earth outside the territory of the Launching State.

Depositaries are Russian Federation, United Kingdom of Great Britain and Northern Ireland and United States of America.[60]

I see that a lot of treaties, agreements and conventions determine people's activities in space. They try to regulate their own actions and the actions of other countries. Of course it all works, but it doesn't mean that they follow the instructions and never break their treaties. In order to be the first and the best the countries get into the races. And now I'd like to dwell upon them.

Space Races

The Space Race

The Space Race was an informal competition between the United States and the Soviet Union that lasted roughly from 1957 to 1975. It involved the parallel efforts by each of those countries to explore outer space with artificial satellites, to send humans into space, and to land people on the Moon. Due to this competition both American and Russian science was developing really quickly. During only half a century the science made a huge step to the future. Here is a timeline of key events in the Space Race.

Date	*Significance*	*Country*	*Mission Name*
August 21, 1957	Intercontinental ballistic missile (ICBM)	USSR	R-7 Semyorka SS-6 Sapwood
October 4, 1957	First artificial satellite	USSR	Sputnik 1
November 3, 1957	First animal in orbit (dog)	USSR	Sputnik 2
January 31, 1958	First US satellite; detection of Van Allen belts	USA-ABMA	Explorer I
December 18, 1958	First communications satellite	USA-ABMA	Project SCORE
January 4, 1959	Artificial satellite (Sun's)	USSR	Luna 1

February 17, 1959	Weather satellite	USA-NASA (NRL)	Vanguard 2
March 3, 1959	First United States lunar probe; missed moon by 37,300 miles.	USA-NASA	Pioneer 4
June 1959	Reconnaissance satellite	USA-Air Force	Discoverer 4
August 7, 1959	Photo of Earth from space	USA-NASA	Explorer 6
September 14, 1959	Probe to Moon	USSR	Luna 2
October 7, 1959	Photo of the far side of the Moon	USSR	Luna 3
August 10, 1960	Carried first payload to be recovered from orbit	USA-NASA	Discoverer 13
April 12, 1961	Human in orbit	USSR	Vostok 1
August 21, 1957	Intercontinental ballistic missile (ICBM)	USSR	R-7 Semyorka SS-6 Sapwood
October 4, 1957	First artificial satellite	USSR	Sputnik 1
November 3, 1957	First animal in orbit (dog)	USSR	Sputnik 2
January 31, 1958	First US satellite; detection of Van Allen belts	USA-ABMA	Explorer I
December 18, 1958	First communications satellite	USA-ABMA	Project SCORE
January 4, 1959	Artificial satellite (Sun's)	USSR	Luna 1

February 17, 1959	Weather satellite	USA-NASA (NRL)	Vanguard 2
June 1959	Reconnaissance satellite	USA-Air Force	Discoverer 4
August 7, 1959	Photo of Earth from space	USA-NASA	Explorer 6
September 14, 1959	Probe to Moon	USSR	Luna 2
October 7, 1959	Photo of the far side of the Moon	USSR	Luna 3
April 12, 1961	Human in orbit	USSR	Vostok 1
April 23, 1962	United States lunar probe to reach moon; crashed.	USA-NASA	Ranger 4
July 10, 1962	First active communications satellite	USA-AT&T	Telstar
September 29, 1962	Artificial satellite by a non-superpower	Canada	Alouette 1
June 16, 1963	Woman in orbit	USSR	Vostok 6
July 26, 1963	First synchronous-orbit communications satellite.	USA-NASA	Syncom 2
July 28, 1964	Took first close-up photographs of lunar surface.	USA-NASA	Ranger 7
Nov. 28, 1964	First successful Mars probe; returned 21 pictures.	USA-NASA	Mariner 4
April 23, 1965	First Soviet communications satellite; capable of color TV.	USSR	Molniya 1

December 15, 1965	Orbital rendezvous	USA-NASA	Gemini 6A/Gemini 7
March 1, 1966	Probe lands on another planet - Venus	USSR	Venera 3
March 16, 1966	In-orbit rendezvous and docking	USA-NASA	Gemini 8
March 31, 1966	First moon-orbiting satellite.	USSR	Luna 10
May 30, 1966	First of Surveyor series to land softly on moon.	USA-NASA	Surveyor 1
Aug. 10, 1966	First of series; photographed potential lunar-landing sites.	USA-NASA	Lunar Orbiter 1
June 14, 1967	Successful probe passed within 2,480 miles of Venus.	USA-NASA	Mariner 5
July 1, 1967	First color photographs of Earth's complete surface.	USA-NASA	DODGE
December 24, 1968	Manned Lunar orbit	USA-NASA	Apollo 8
February 24, 1969	Twin Mars probes; transmitted photographs and other data.	USA-NASA	Mariner 6
July 20, 1969	Human on the Moon	USA-NASA	Apollo 11
Aug. 17, 1970	First spacecraft to make soft landing on Venus.	USSR	Venera 7
September 12, 1970	First unmanned spacecraft to return lunar material to Earth.	USSR	Luna 16
Nov. 11, 1970	Carried first unmanned lunar roving vehicle, Lunokhod 1.	USSR	Luna 17
April 23, 1971	Space station	USSR	Salyut 1

May 19, 1971	Mars probe; instrument package first man-made object to land on Mars.	USSR	Mars 2
November 14, 1971	Satellite orbits another planet - Mars	USA-NASA	Mariner 9
March 3, 1972	First Jupiter probe; sent close-up photographs; in 1983 became first man-made object to escape solar system.	USA-NASA	Pioneer 10
Aug. 21, 1972	Earth satellite to observe stars; last of Orbiting Astronomical Observatories.	USA-NASA	OAO-C
November 9, 1972	Geostationary communications satellite	Canada-BCE	Anik A1
April 5, 1973	First Saturn probe; showed Saturn's rings to be made of ice and discovered new ring.	USA-NASA	Pioneer 11
November 3, 1973	First flyby of Mercury; discovered light atmosphere and magnetic field.	USA-NASA	Mariner 10
June 8, 1975	Twin Venus probes; both deployed descent capsules that returned data, including the first photographs taken on the surface of another planet.	USSR	Venera 9
June 14, 1975		USSR	Venera 10
July 15, 1975		USSR	Apollo-Soyuz Test Project
	First U.S.-USSR joint mission	USA-NASA	

The Cold War finished, the Space Race stopped. From this table it's seen that USSR and the USA were eager to win the competition but finally they came to cooperation. We've searched for the events in this Race and have found that USSR and the USA did practically equal number of missions (27-USSR, 31-USA) and finally came to cooperation and organized the First U.S.-USSR joint mission in July 15, 1975. But in the XXI century a new space "competition" began.[63.64]

The Second Space Race

XXI century is the time of The Second Space Race. As it is seen in our first table, the countries that want to dominate the world powers are the United States, China, the European Union, Russia, Japan, and India. "Although these efforts do not resemble a conflict in a conventional military sense, national security, defensive capability, and technological superiority does and will continue to provide an impetus for competition, especially when considering the significant role which satellites play in command and control, weapons-targeting, and reconnaissance. Notwithstanding the technological and military aspects of this drive for the ever-higher ground, national pride and economic impulses are also unable to be excluded as major contributing factors". [65]

There was the first space race and finally the countries came to conclusion. Now all these countries that are mentioned above are already seem to be in cooperation and in a peaceful state of space investigation. But what will happen if any of the countries want to dominate and control the space and our planet? The answer to this question is terrifying, we may only hope, nothing of the kind will happen and we'll learn to deal with space and with each other.

National and international organizations that monitor space

Not only treaties but also different organizations control people's actions in space. We can distinguish two types of them: national and international ones. Not every country has possibilities for exploring and using space but it has its own space agency, or institute or something like that.[66]

ARGENTINA
National Commission on Space Activities (CONAE)

AUSTRALIA
Australian Gov't Links
Commonwealth Scientific Industrial Research Organization (CSIRO)

BRAZIL
Brazilian Space Agency (AEB)
Instituto Nacional de Pesquisas Espaciais (National Institute for Space Research) (INPE)

CANADA
Canadian Space Agency

FRANCE
Centre National d'Etudes Spatiales (CNES)
Office National d'Études et de Recherches Aérospatiales (ONERA/CERT)
French Ministry of Research

GERMANY

German Aerospace Center (DLR)
Max Planck Institutes
GFZ

INTERNATIONAL ORGANIZATIONS

European Space Agency (ESA)
International Telecommunications Satellite Organization (INTELSAT)
International Maritime Satellite Organization (INMARSAT)
European Telecommunications Satellite Organisation (EUTELSAT)
North Atlantic Treaty Organization (NATO)
NATO / Research and Technology Organization
International Standards Organization (ISO)
Organization for Economic Cooperation and Development (OECD)
United Nations Office for Outer Space Affairs

ITALY

Italian Space Agency (ASI)

JAPAN

Institute of Space and Astronautical Science (ISAS)
Japan Aerospace Exploration Agency (JAXA)
Ministry of International Trade and Industry (MITI)
Electrotechnical Laboratory (ETL)
Ministry of Education, Culture, Sports, Science and Technology
Japanese Patent Office

THE NETHERLANDS

National Aerospace Laboratory (NLR)

The Netherlands Agency for Aerospace Programmes (NIVR)
Space Research Organization Netherlands

RUSSIAN FEDERATION
Russian Aviation and Space Agency
Russian Space Science Internet
Russian Academy of Sciences (RAS)
Space Research Institute (IKI)
Other Russian Aerospace Links

SOUTH KOREA
Ministry of Science and Technology (MOST)
Korean Aerospace Research Institute (KARI)

NORWAY
Norwegian Space Centre

SPAIN
Instituto Nacional de Técnica Aeroespacial (INTA)

SWEDEN
Swedish Space Corporation

TAIWAN
National Space Program Office of Taiwan

UNITED KINGDOM
British National Space Centre (BNSC)

Conclusion

More and more countries are becoming able to use space. USA, Russian Federation, Europe, India, China and Japan have lots of space programs for different purposes such as manned and unmanned exploration of the Solar system, providing commercial launch services, studying the Earth from space, manned missions to other planets and exploration of planets, establishing manned lunar bases and other ones. There are 18 actors that have sub-orbital capability, which is required for a rocket to enter space in its trajectory, but not achieve an orbit around the Earth. These actors are Argentina, Australia, Brazil, Canada, Germany, Iran, Iraq, Italy, Lybia, North Korea, South Korea, Pakistan, South Africa, Spain, Sweden, Switzerland, Saudi Arabia, and Syria. In addition, Iran and North Korea maintain long-range missile programs that would enable them to develop an orbital launch capability. The movements of all countries in space are monitored by national and international space organizations. It is obvious that further development of space research will open new possibilities for the mankind. But what results we will have? Will all the countries "keep the rule"? What if it happens as it happened in 1985 with ASAT weapons, when the Soviet Union became free from its commitment because of the USA's real tests of this system in space?

Vladimir Petrovsky , a Russian Ministry of Foreign Affairs said:" … What is needed for future security in outer space are action-oriented discussions- productive exchanges that pool collective wisdom and in the long run will bring about tangible results"[68]. And as modern scientists suppose about the power of our thoughts I believe Petrovsky is right about the "collective wisdom", only if all the countries think one way there will be a result.

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