

First of all I would like to introduce myself. My name is Misha or Michael (as you like). My family name is Pletenyov.

I live in the heart of Russia, in the Urals, which separate Europe and Asia.

I live in a small, so-called “closed town” with a beautiful name Snezhinsk.

It is the town of science and scientists. Most of our parents work in VNIITF, Federal Nuclear Center, Research Institute of Technical Physics.

I am 10th-grade student in school 125.

To participate in the Critical Issues Forum students and teachers prepared some reports and issues on the History of Russian Rocketry, Missiles and Missile Defense.

Now I would like to show you the summary of our work.

# Critical Issues Forum

## Report

The history of Russian rocketry goes back to the 17th century. The date reporting the first use and describes the first true rocket was in "The Charter of Cannons, Guns etc., concerning to a military science" by Anisim Mikhailov. It was in the years of 1607-1621.

It is known that in 1680 in Moscow under the tsar Peter the Great "Rocket Institution" was opened. There an alarm rocket "A Sample 1717" was developed, rising on height up to 1 km.

Later during the war of 1812 general Zasyadko created rockets in caliber up to 100 mm and range up to 2,7 km; he also created burning and demolition rockets and the starting machine tool.

It was the era of powder rockets.

Another general Konstantinov in 1850-1851 invented a line of devices to study the process at burning of powder mix in rockets,

he increased the range up to 5 km and also the accuracy and reliability of rockets.

Then came the era of trunk artillery.

Later smokeless gunpowder was successfully developed in rocket engineering.

Nickolay Kibalchich was one of the first who invented a rocket engine and described the engineering idea of space flight.

By the end of the 19th century the idea of application of jet devices for flight led to establishing of scientific societies and organizations, later scientific research institutes and constructive bureau: CAGI, OIMS, GDL, GIRD, RNII and others.

A lot of famous scientists worked in them and created and invented a lot of new engines, electric rocket engines that used plasma, liquid and electrothermal rocket engines.

In 1930, Russian government rocket design teams in RNII led by Fridrikh Tsander and Valentin Glushko began testing a number of liquid-fueled rocket engines.

These Russian rocket tests continued through 1937, and tested liquid-fueled rocket engine concepts burning (such combinations as gasoline/gaseous air, toluene/nitrogen tetroxide, gasoline/liquid oxygen, kerosene/nitric acid and kerosene/tetranitromethane).

One of the rockets was called GIRD-X. It reached a maximum altitude of 3 miles during a test on November 25, 1933.

The next rocket Aviavnito reached 3,5 miles in 1936.

Famous rocket shells RS-82 and volley "Katyusha" were also made in RNII.

It was the beginning of the 20th century, the century of space exploration.

By the end of the 19th century, the 3 men considered to be the primary pioneers of modern rocketry had been born and begun their studies.

### Konstantin Eduardovich Tsiolkovsky

One of them was Konstantin Eduardovich Tsiolkovsky, the schoolteacher from Kaluga Province.

His formal education was terminated tragically at age ten when he suffered a near-total hearing loss from scarlet fever. He began to educate himself at home. He was consumed by his passion for the sciences.

He tried his hand at science fiction, with the inspiration of Jules Verne's stories he began to write of interplanetary travel.

On the merits of some of his early research and writings, Tsiolkovsky was elected to the Society of Physics and Chemistry at St.Petersburg, Russia.

Tsiolkovsky completed a draft of his first design of a reaction thrust motor on

August 25, 1898. The following year, he received a grant of 470 rubles from the Academy of Sciences Physics and Mathematics Department to engage in research. This work was dedicated to the establishment of the scientific principles, so no actual motors were developed.

In 1903, his first article on rocketry "Exploration of Space With Rocket Devices" appeared.

Also in 1903, Tsiolkovsky drafted the design of his first rocket. It was to be powered by a combination of liquid oxygen and liquid hydrogen, which would create an explosive mixture at the narrow end of a tube. Burning of the fuels would produce condensed and heated gases. The gases would then be quickly cooled and rarefied at the wider end of the tube, located at the tail of the rocket. The resulting exhaust, escaping from a nozzle, would provide lift-off thrust at a relatively high velocity.

In subsequent writings, Tsiolkovsky speculated on a multi-stage approach to spaceflight. He envisioned a fantastic "Passenger Rocket Train of 2017" which employed 20 single-engine rocket stages, each of which carried its own fuel.

In 1919, Tsiolkovsky was elected to the Socialist Academy, which later became the U.S.S.R. Academy of Science.

Between 1925 and 1932 he wrote about 60 works on astronautics, astronomy, mechanics, physics and philosophy.

He died on September 19, 1935.

His book "Na Lune" (On The Moon) was published in 1935. It contained prophetic speculation on space flight, as well as offered descriptions on the types of rockets and vehicles necessary for the task.

Although practical strides in rocketry were being made at this time in other parts of the world, Tsiolkovsky never saw his designs materialize. His rocket motors were neither built nor tested,

primarily due to Russian political instability, lack of resources and inadequate technical personnel.

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After the World War 2 science and technical development made a giant hop to new discoveries and inventions in rocketry and space research:

- researches of the top layers of atmosphere;
- geophysical rockets launches;
- meteorological rockets-scouts.

On October 4, 1957 the U.S.S.R. launched Sputnik 1, the world's first artificial satellite.

The second satellite of the Earth was started on November 3, 1957. It represented last missile stage of the carrier in which there were containers with scientific and measuring equipment and also a cabin with experimental animal-dog Laika.

Then there were a number of scientific, experimental and meteorological satellites of different kinds: "Polyot", "Elektron", "Zenit", "Molniya", "Interkosmos", "Meteor" and "Proton".

On "Proton" there was unique equipment capable automatically to select from all articles of space beams only those that had high

energy to measure this energy, to define their nature, to study their interaction with nucleus of substance.

On April 12, 1961 in the Soviet Union the first-ever spaceship "Vostok" with the person on board was put into orbit around the Earth. The first cosmonaut in the history of the world was Yuri Alekseevich Gagarin.

Start of a multistage missile was successful, and after a set of the first space speed and branch from last missile stage of the carrier the ship-satellite began free flight.

The cycle time of the ship around the Earth made 89,1 minutes. The minimal distance from the surface of the Earth was equaled 175 km, and the maximal distance made 302 km. Its weight with the cosmonaut made 4725 kg. The flight lasted for 108 minutes.

SO, the space age of men's flights into space, so mysterious and attractive, drawing by many generations of people, has begun.

## Missiles and Missile Development

A rocket or a missile is really the weapon of the 20th century. This combination of huge speeds and fantastic destructive force of the warhead equipped with a nuclear charge. Ballistic long-range rockets became powerful means of the armed struggle.

Rockets have the certain fighting characteristics, features of the device, operation and fighting application.

THE FLIGHTING MISSILE IS THE FLIGHTING DEVICE PILOTLESS CONTROLLED OR UNGUIDED ON THE TRAJECTORY MAKING FLIGHT UNDER ACTION OF JET FORCE AND INTENDED FOR DELIVERY OF THE FIGHTING PART TO THE PURPOSE (AIM).

- 1) On a combat missile there is no pilot as a control link;
- 2) Moving of a rocket to flight (space) occurs under action of jet force-due to the engine of direct reaction;
- 3) On board a rocket the fighting part is placed.

On fighting purpose rockets share to tactical, operational and strategic.

On a site of start and the purpose rockets share on classes. For example,

"Surface-to-surface", "surface-to-air", "surface-to-ship", or "ship-to-air" and so on.

Classification of rockets by constructive attributes is most extensive. One of them is the type of the engine. So, the combat missiles, supplied with liquid rocket engines, work on liquid fuel. Rocket engines of firm fuel work on the fuel, which is taking place in a firm modular condition. Combat missiles with air-breathing engines refuels on the ground and uses oxygen of air.

Chemical jet engines use the energy necessary to move a rocket into space, turns out due to chemical reaction of burning fuel.

Nuclear jet engines use the result of reaction of division, synthesis and radioactive disintegration of nucleus of atoms of some elements.

On number of steps (stages) missiles are divided into one-stage, two-stage or in another words multi-stage (or compound). How many stages can be in a rocket? - As many as necessary.

The form of a rocket determines its device and the trajectory of flight. The two big classes of rockets are ballistic and winged.

Depending on an opportunity of management all combat missiles share on controlled and unguided.

### A “Family Tree” of Russian Missile

#### Development

#### R-1

On April 14, 1948 the Government Decree has been enacted on the development of the first rocket to be made of domestic materials and derived from missile FAU-2 (German). The rocket was designated as R-1 including its ground support equipment.

#### R-5

Work on a new rocket further designated, as R-5 was a continuation of theoretical design and experimental work on a far-range ballistic rocket of improved performance. The rocket design has been completed by October 1951.

#### **R-5M**

The first strategic rocket R-5M was derived from rocket R-5 in accordance with the Decree of April 19, 1954 to carry a nuclear warhead to a range of 1200 km.

## R-7

The Government Decree of February 13, 1953 obliged to work out a preliminary design of a two-stage ballistic rocket 170 t in mass with a separable warhead 3000 kg in mass capable to be launched to a range of 8000 km. In October 1953, the design assignment was changed: a fire charge mass was increased to 3000 kg with a flight range remained unchanged, i.e. (id est) the design had to be modified radically.

## R-11

Rocket R-11 was also designed under the Government Decree of February 13, 1953.

## R-11A

Based on rocket R-11, geophysical rocket –11A has been designed and launched on the Novaya Zemlya (New Land).

## R-11FM

It was decided to introduce far-range ballistic rockets in the capacity of the navy armament starting from a diesel submarine. R-11FM became the first operations rocket adapted for launching from submarines.

## R-9

After the achievements of 1958, the Board of Chief Designers forwarded a proposal to the USSR Government to develop new intercontinental rocket R-9.

## RT-2P

In 1959 the Government Decree enacted OKB-1 to initiate work on the development of ballistic rockets using solid propellant RT-1 with a warhead flight range of 2500 km.

“The Cold war”, being on advantage the phenomenon of the world politics, nevertheless has seriously affected and internal life.

If to count its beginning from Truman`s doctrine on March 12, 1947, till the end of disintegration of the USSR on December 8, 1991, the “Cold War” had lasted for almost 45 years.

The “Cold war” though it did not become, fortunately, “hot”, has raised (increased) militarism to unprecedented sizes in policy, politics and thinking. Everything in the world politics began to be estimated from the point of view of a parity (ratio) of military force, balance of tanks, planes, and warheads. Threat of force application, ”nuclear intimidation” contrary to the Charter of the United Nations became the main instrument of policy and politics. Race of arms has resulted into the formation of unprecedented for a peace time military-industrial complex in the USSR and the USA, including armed forces, industries producing arms, research establishments developing all new and new kinds and, at last, institutions which planned and coordinated all this great work. The political role and prestige of the ministries and departments knowing these questions has sharply increased. Militarization of mass consciousness had also taken place. Military service seemed to become worship. The image of the enemy, or as

the ruthless, artful communist, or as so ruthless, greedy imperialist was formed.

During the years of the “Cold War” a lot of regional war conflicts were in different parts of the world:

- War between India and Pakistan in 1947 and 1971;
- War in the Middle East in 1949 and Arabo-Israeli war in 1973;
- Korean War in 1950;
- War between Vietnam and Cambodia in 1979;
- Conflict between Japan and the USSR at the end of 1950s;
- the Cuban Missile Crisis;
- the Iran-Iraq War.

Different missiles were used in these wars and conflicts.

But the most terrible result of the “Cold War” and arms race has become 5 Nuclear Weapons States-owners of nuclear arms and missiles supplied with nuclear warheads.

More over, there are 3 more defacto nuclear power states and 4 potential nuclear power states. (You can see them on the map).

Besides the giant number of means spent on their development it is more important to keep and secure them with safety. Missiles, supplied with nuclear warheads, are the most destructive and the most dangerous.

It is no longer a secret that nuclear weapons have been used to intimidate the world and to prepare the road for global domination.

If I were the President of the world or the King of the Earth I would stop any tests of any weapons especially of the weapons of mass destruction.

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