Russian military space program

Yesterday, today and tomorrow

By Anatoly Zak

Nov. 3, 2011

Origin of the Soviet military space program

Key dates

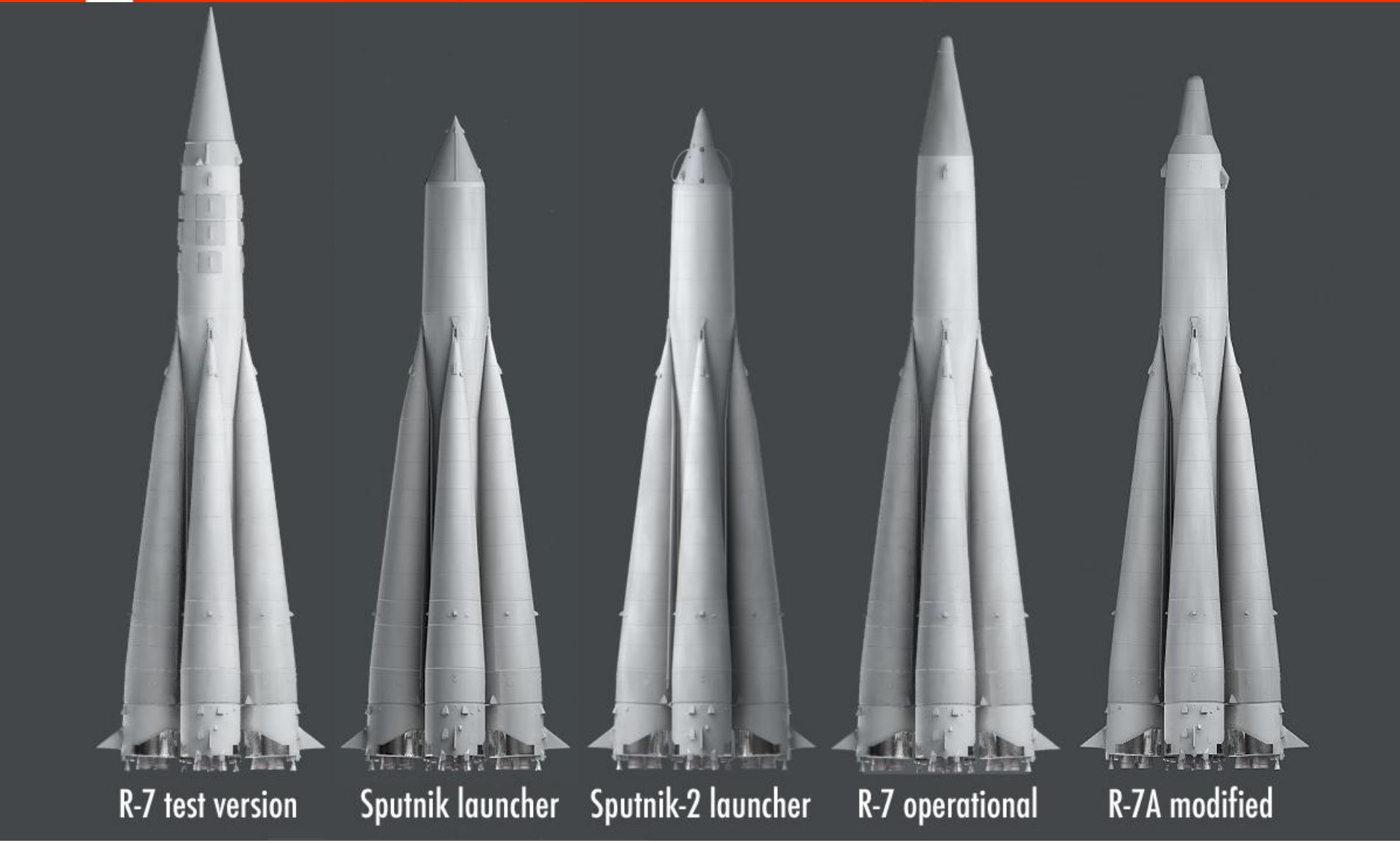
- 1954: Official start of ICBM development
- 1955: Foundation of the Tyuratam test range
- 1957: Beginning of ICBM tests

Pecuilarities

No really separate civilian space program or a civilian space agency in existence

All activities led by Ministry of Defense

Original ICBM



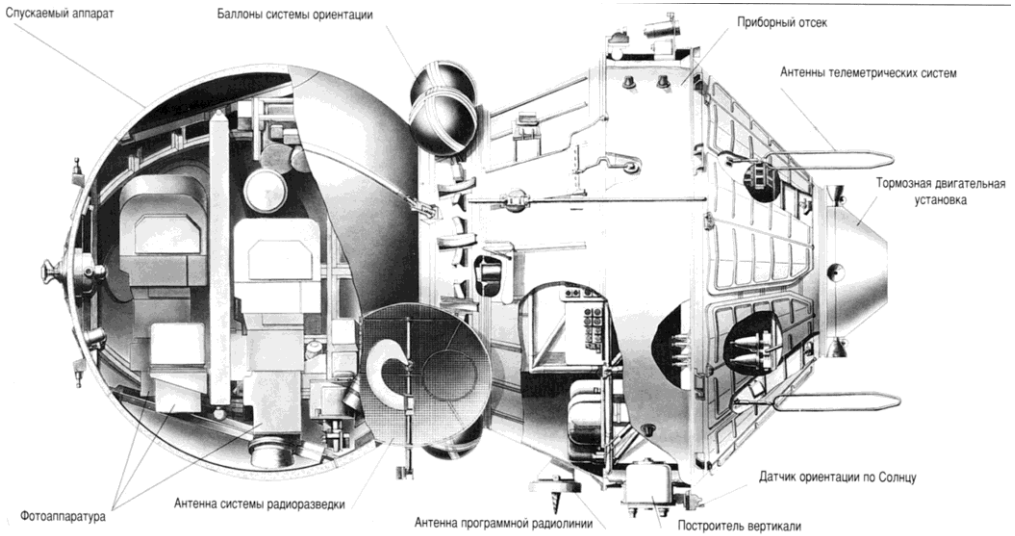
Origin of Sputnik

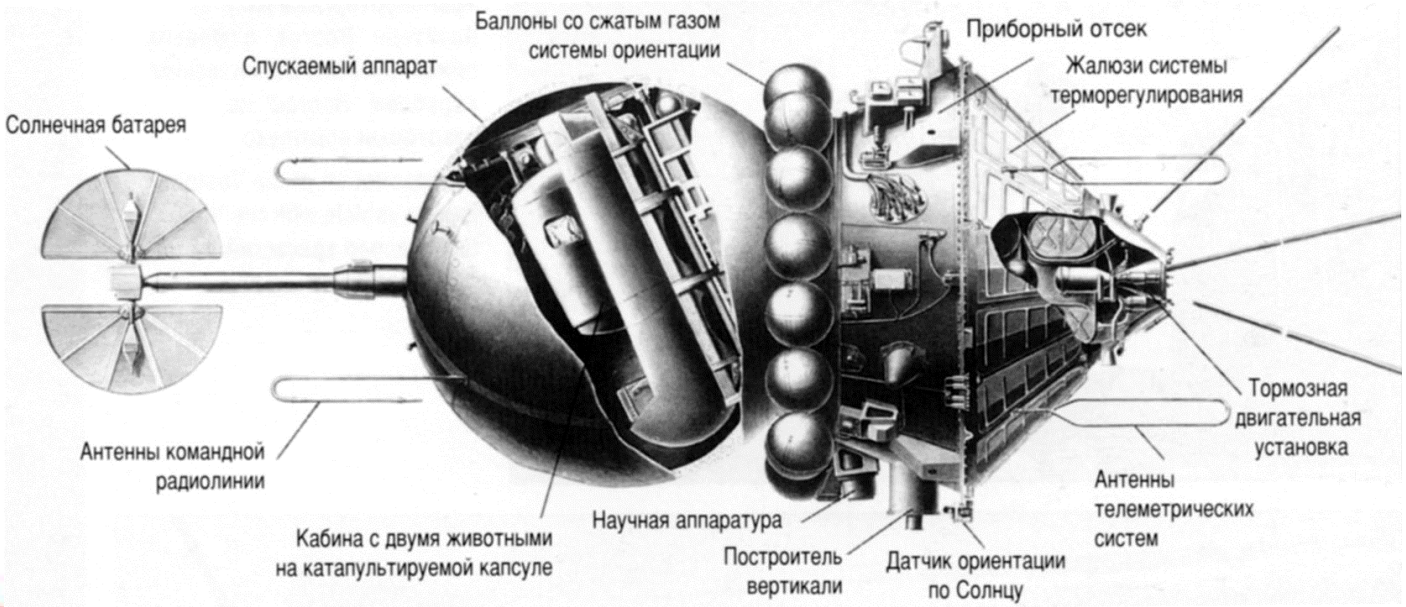
- A “civilian” Sputnik project originated as a small extension of the ICBM development program
- Minor modifications of R-7 ICBM were required to launch the satellite
- All Sputnik launch and tracking activities were conducted by the military
- While Sputnik captured world’s imagination, its vehicle remains in the shadows for a decade due to its military nature

Origins of manned spaceflight

- A manned spacecraft shares all key design features with a proposed reconnaissance satellite.
- Military roles are sought for manned spaceflight to ensure military funding and support
- Crew training managed by the Air Force

Zenit and Vostok

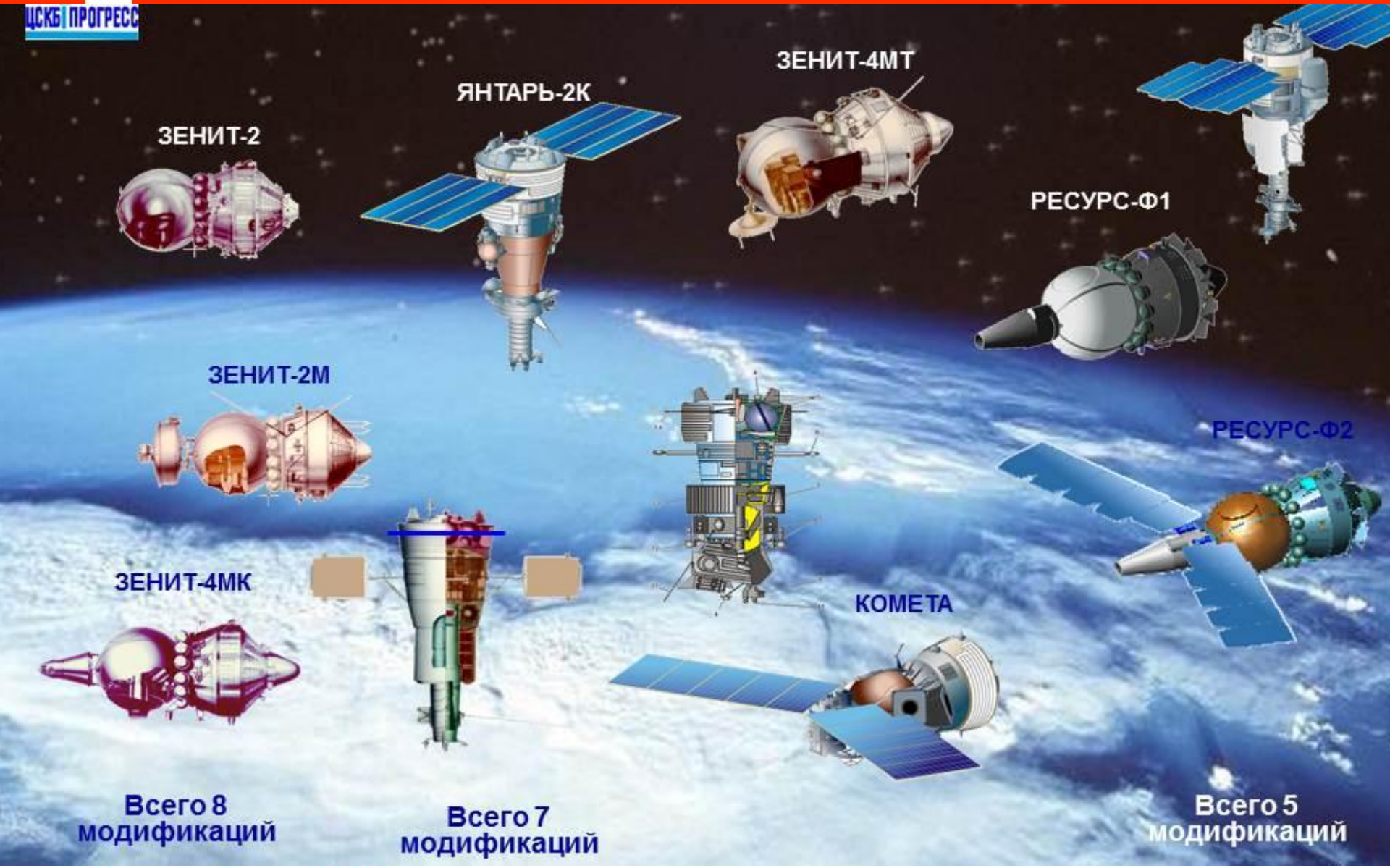




Growth of military space program

- 1960: To manage space activities, the 3rd Directorate within the Chief Directorate of the Rocket Armaments was organized within Ministry of Defense
- 1964: Central Directorate of Space Assets, TsUKOS
- 1970: Chief Directorate of Space Assets, GUKOS
- 1985-1986: GUKOS separated from RVSN and subordinated directly to the Minister of Defense, creating Chief Directorate of Space Assets, UNKS. A unified Space Command was organized to launch and track the spacecraft.

Proliferation of imaging satellites



Non-combat roles for military spacecraft

Applications:

Reconnaissance/ELINT: Zenit, Yantar

Early warning, SPRN: Oko

Weather: Meteor

Communications: Raduga

Navigation: GLONASS

Missile guidance: US-A, US-P

Calibration/testing

Combat roles for spacecraft

- ASAT/PKO:
  - IS, IS-MU, IS-MD/Naryad, Naryad-V
- Anti-missile defense/ASAT:
  - Kaskad, Skif
- Bombardment of ground targets:
  - FOBS/R-36
- Inspection
  - Spiral (?)

ASAT (PKO) system

IS (satellite destroyer)
Development start: ~1961
First prototype launch: Nov. 1, 1963
Experimental operation: 1971
Break in tests: 1972-1975
Operational: 1973
Unilateral moratorium on tests: 1983

IS-MU
Operational: April 1991
Official end of operations: August 1993

Kaskad 17F111 system

- Since 1976 work on space-based ASAT, AMD and bombardment systems
- Laser-based and rocket powered anti-missile system based on the 17K DOS space station
- Launched by Proton or Buran
- Developed in mid-1980s by RKK Energia and KB Tochmash (OKB-16)

Anti-missile defense “Star Wars”

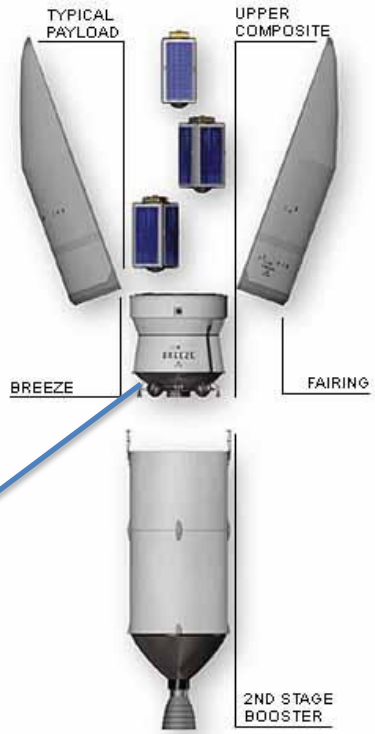
- Summer 1974: NPO Energia conducted limited work on space-based interceptor systems
- Laser system under development
- 1981: KB Salyut starts developing what would become Skif-DM (17F19) – 95-ton battle station prototype

Plans

- 1988: Skif-D1: NPO Astrophysika
- Skif-Stilet with an infrared laser
- September 1987: Laser weapons research discontinued at KB Salyut

Naryad project

IS-MD Naryad system reaching geostationary orbit under development since 1988



Reorganization in the 1990s

- August 1992: Military Space Forces, VKS, are organized, including Baikonur and Plesetsk units
- 1994: Svobodny joins VKS
- Main Test and Control Center, GITsIU KS
- Mozhaisky Military Engineering Academy
- 50th TsNII MO
- Arsenal
- 1997: VKS merger with RVSN
- 2001: Space Forces of Russia, KVR, are organized

New organization after 2009

- Plesetsk launch site (1st State Test Range);
- Titov Chief Center for Testing and Control of Space Assets, GITsIU KS;
- Chief Center of Outer Space Monitoring, GTs KKP;
- Chief Center for Early Warning of Rocket Attack, GTs PRN;
- Anti-missile defense units;
- A directorate for deployment of new systems and complexes of Space forces;
- Mozhaisky military space academy, with Moscow military institute of radio-electronics of Space forces and Cherepovetsk military engineering institute of radio-electronics;
- Guard, logistics and support units;

Current KVR roles

- Early warning
- Moscow antimissile defense
- Space monitoring
- R&D
- Launch and deployment
- Tracking and control of military and civilian space assets

Titov Chief Test and Control Center, GITsU KS

- Launch control for satellites and ICBM
- Tracking and control of 80 percent of Russian spacecraft

Upgrades in 2010

New telemetry, command and measuring systems

Smaller ground stations

Four new ground stations for the SKKP network were promised by 2020.

Soviet early warning radar

Russian early warning radar

New-generation Voronezh-DM radar
Less power consumption (40 percent)
Range: 4,500 kilometers
Only 15 people instead of 80

1. operational in 2009
In Lekhtusi, St Petersburg.

2. Armavir ~ 2010

Daryal (Azeri station in Gabala) promised to stay open

Control and early warning assets

- 2003: Volga RLS in Belarus is introduced
- 2004: Optical Okno complex in Tadzhikistan (ASAT role)
- 2011: New warning radar in Lekhtusi
- Beginning in 2012: New Voronezh-DM radar stations in Armavir, Kaliningrad, Irkutsk etc.
- By Dec. 1, 2011, merger of early-warning, PRN, space monitoring, KKP, and anti-missile, PRO, units to form a centralized VKO structure

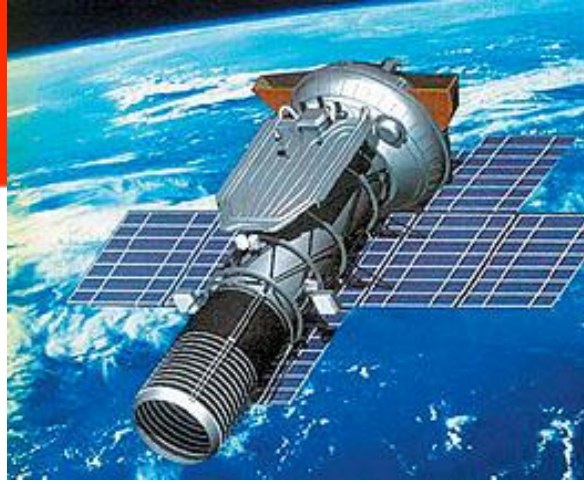
Space projects

Launch systems:

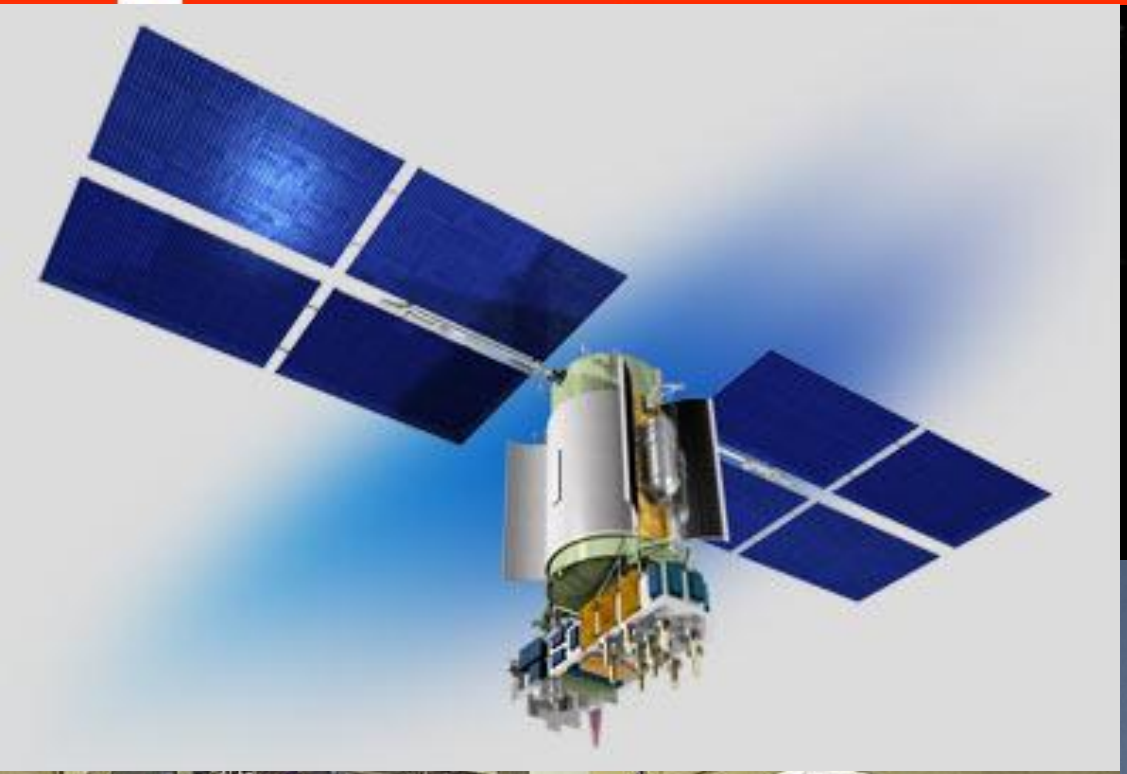
- Launch site for Angara-1 and 5 rockets (2013)
- Launch site for Soyuz-2 (operational)
- Soyuz-1 testing (2012-2014)

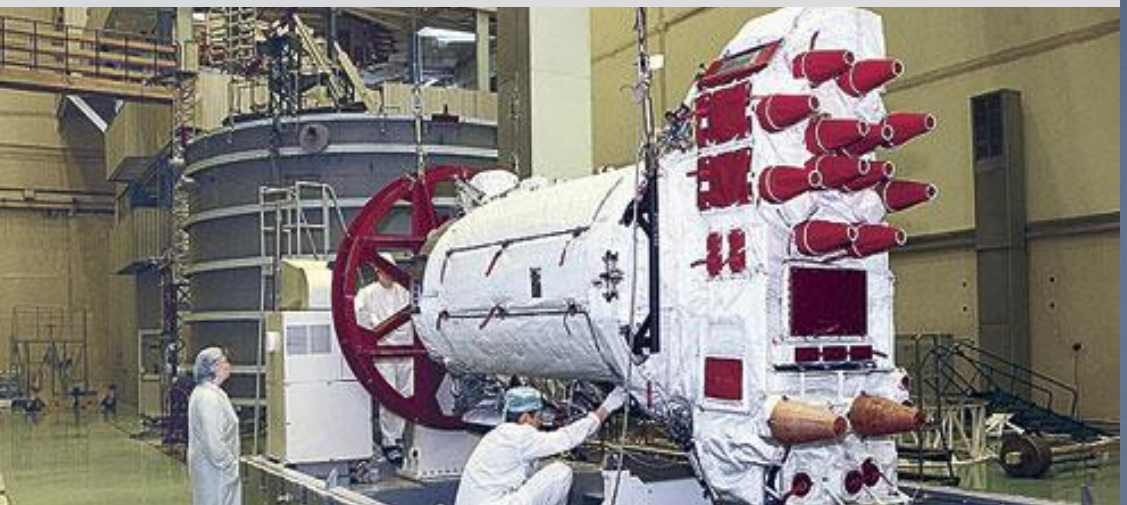
Spacecraft systems:

Persona, Lotos, Meridian, Kondor, Geo-IK, Garpun, GLONASS, EKS

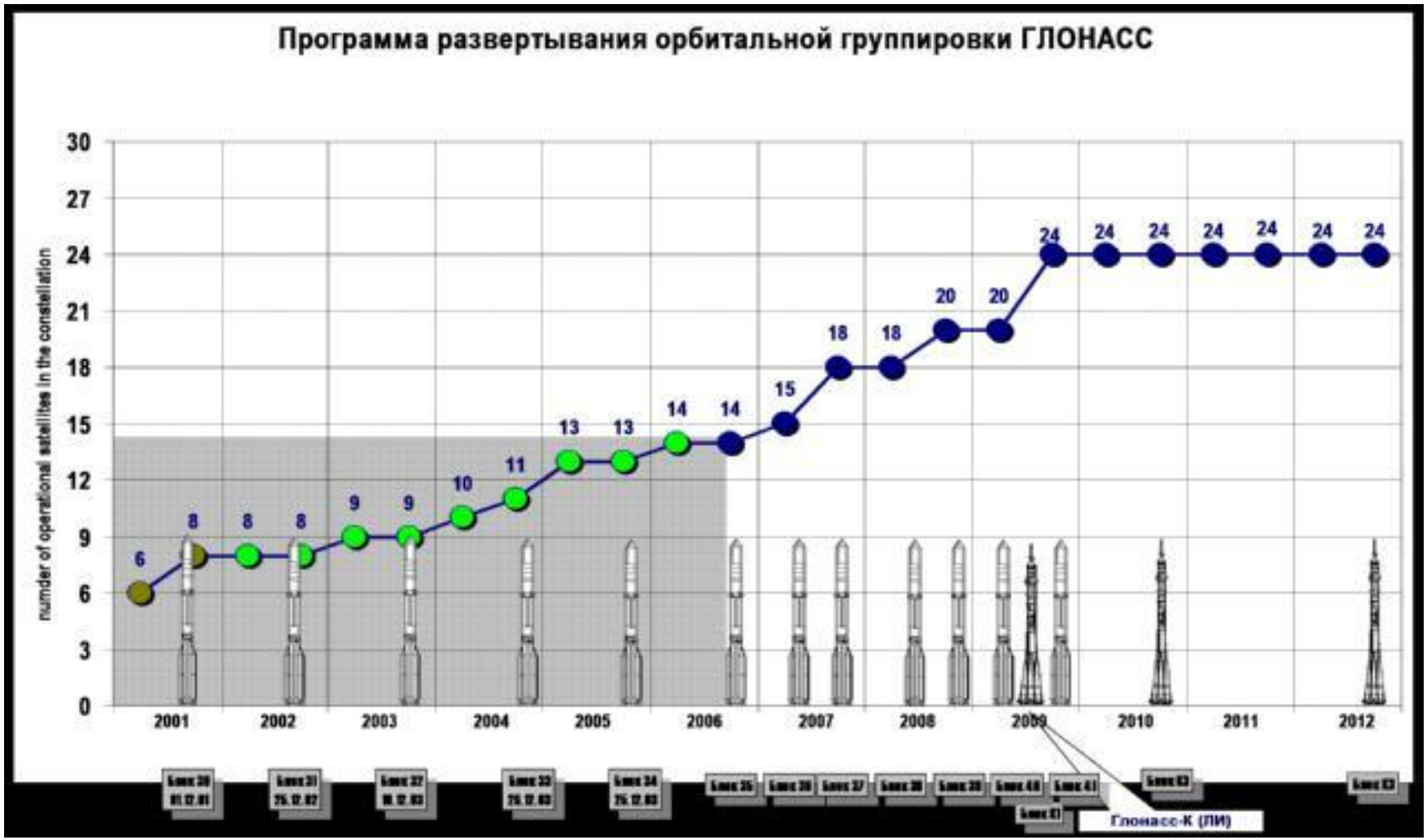


GLONASS-M





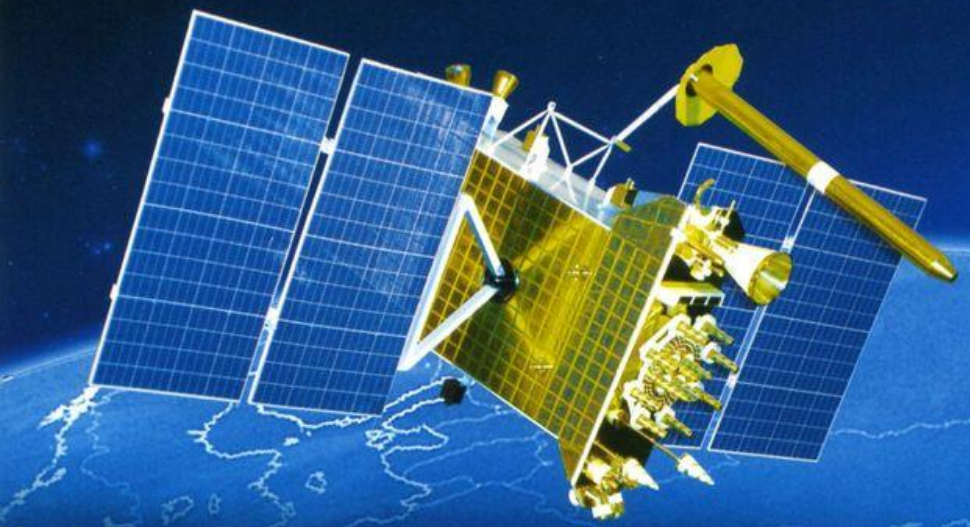
GLONASS deployment



GLONASS-K

NEXT-GENERATION NAVIGATION SPACECRAFT

RESHETNEV
COMPANY



Glonass-K is a next-generation unpressurized navigation satellite designed to provide users with high-precision three-dimensional position data. Its advanced mission-critical equipment will ensure the GLONASS system new competitive advantages in terms of navigational accuracy and capabilities for search and rescue operations.

Technical parameters

Number of s/c in a constellation	24
Orbit	Type: circular Altitude: 19140 km
Mass	950 kg
Power consumption	1270 W
Number of navigation signals	5
Operational life	10 years
Launcher	Soyuz-2; Angara-3

GLONASS challenges

Cost: $10.8B for 2012-2020

Accuracy: 5 m (GPS: 2 m)

Thank you!

For more info please visit:

RussianSpaceWeb.com

Image credits:
Anatoly Zak / RussianSpaceWeb.com, Roskosmos, RKK Energia, ISS Reshetnev, NPO Lavochkin, Eurockot, TsSKB Progress