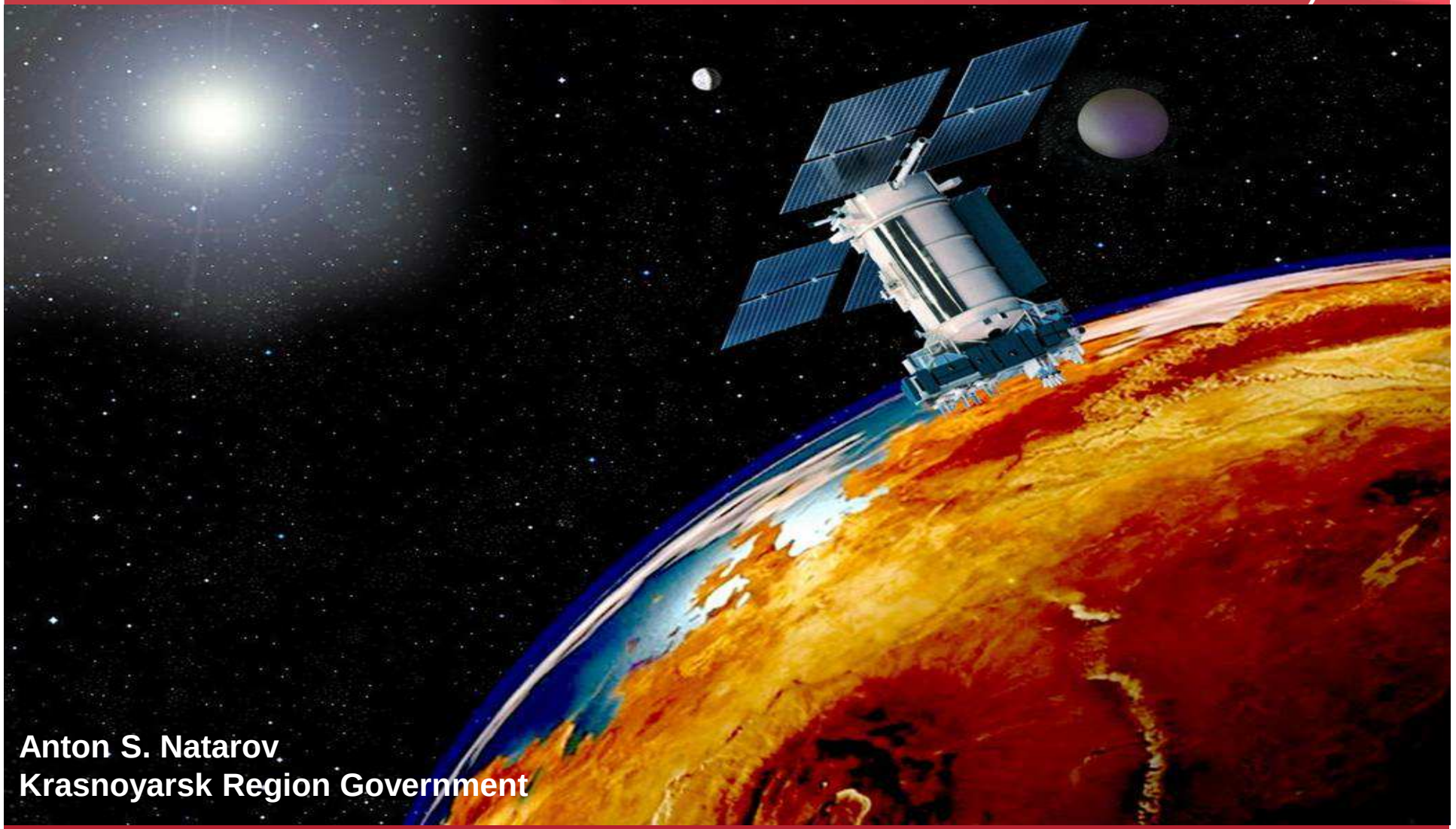
OPPORTUNITIES OF THE KRASNOYARSK REGION IN THE SPHERE OF OUTER SPACE AND RELATED TECHNOLOGIES (IN THE LIGHT OF THE UNITED NATIONS/ RUSSIAN FEDERATION WORKSHOP ON THE APPLICATIONS OF GLOBAL NAVIGATION SATELLITE SYSTEMS/ GLONASS SCHEDULED TO TAKE PLACE IN KRASNOYARSK IN MAY 2015)

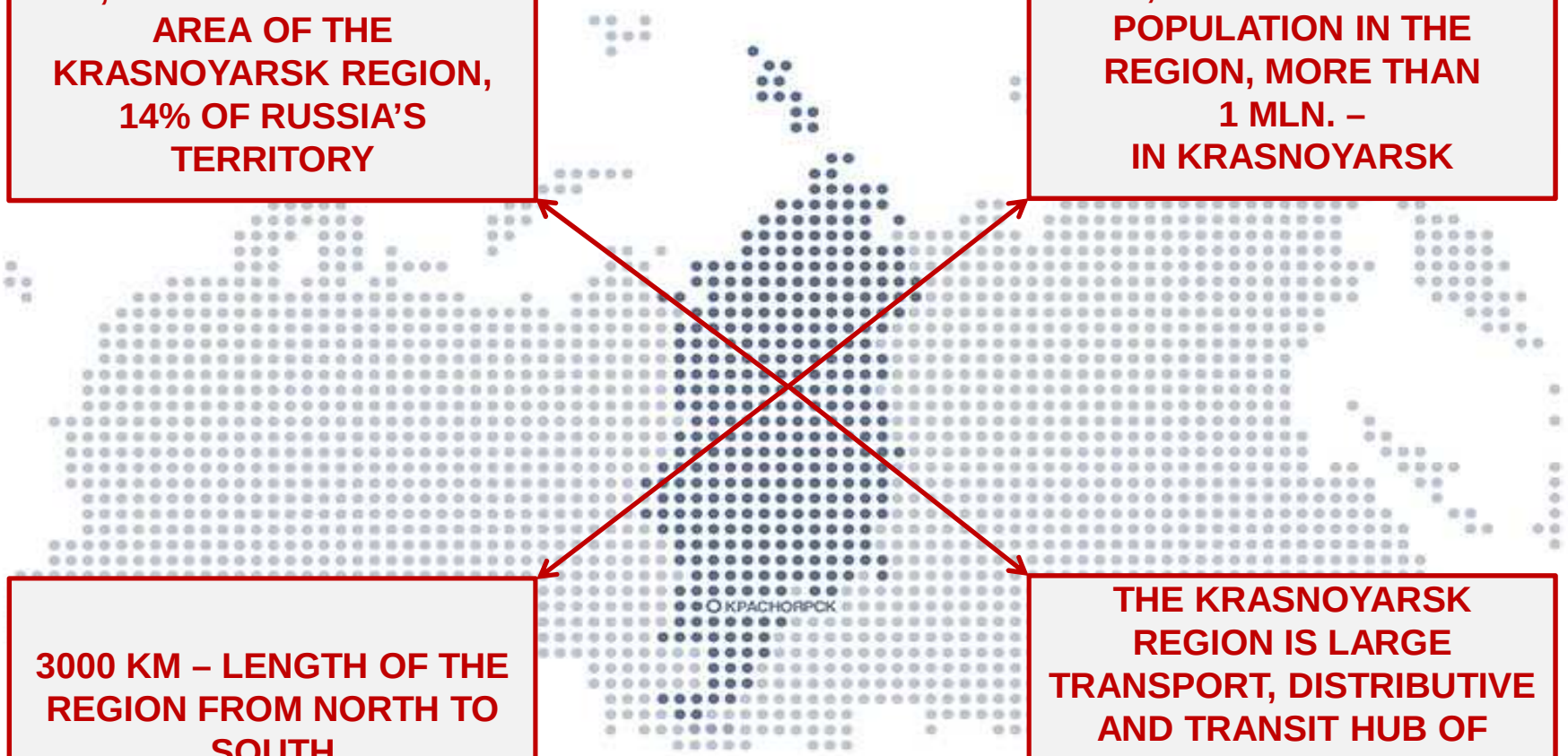


Anton S. Natarov
Krasnoyarsk Region Government

THE POSITION OF THE KRASNOYARSK REGION WITHIN THE RUSSIAN FEDERATION

2,3 MLN. KM2 – TOTAL AREA OF THE KRASNOYARSK REGION, 14% OF RUSSIA'S TERRITORY

2,9 MLN. PEOPLE – POPULATION IN THE REGION, MORE THAN 1 MLN. – IN KRASNOYARSK



3000 KM – LENGTH OF THE REGION FROM NORTH TO SOUTH

THE KRASNOYARSK REGION IS LARGE TRANSPORT, DISTRIBUTIVE AND TRANSIT HUB OF SIBERIAN FEDERAL DISTRICT

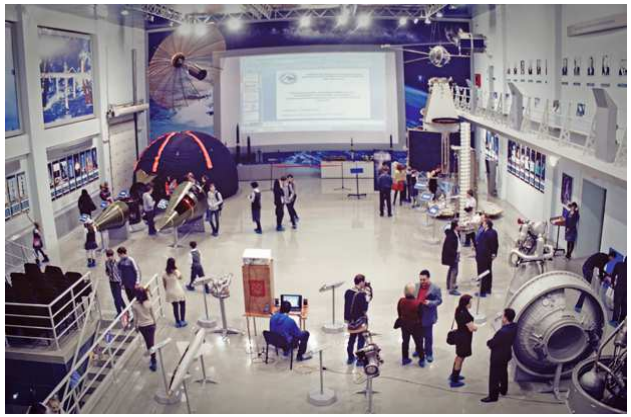
SCIENTIFIC AND EDUCATIONAL POTENTIAL

The educational system of the Krasnoyarsk Region includes 10 public higher education institutions

2 institutions prepare specialists for space industry

Siberian Federal University

Siberian State Aerospace University n.a. academician M.F. Reshetnev



ISS ROLE WITHIN SPACE SYSTEM OF THE RUSSIAN FEDERATION

Mikhail Reshetnev
General Designer and General Director (1959-1996), Academician of the Russian Academy of Sciences

June 4, 1959

Affiliated company of Design Bureau No.1 was established in the city of Krasnoyarsk–26 (today, city of Zheleznogorsk)

AREAS:

- Communication
- Retransmission
- TV and radio broadcasting
- Navigation
- Geodesy
- Earth remote sensing

SV MANUFACTURING CYCLE

- Development
- Manufacture
- Testing
- Satellites and systems maintenance

2/3 of Russian orbital constellation are the ISS satellites

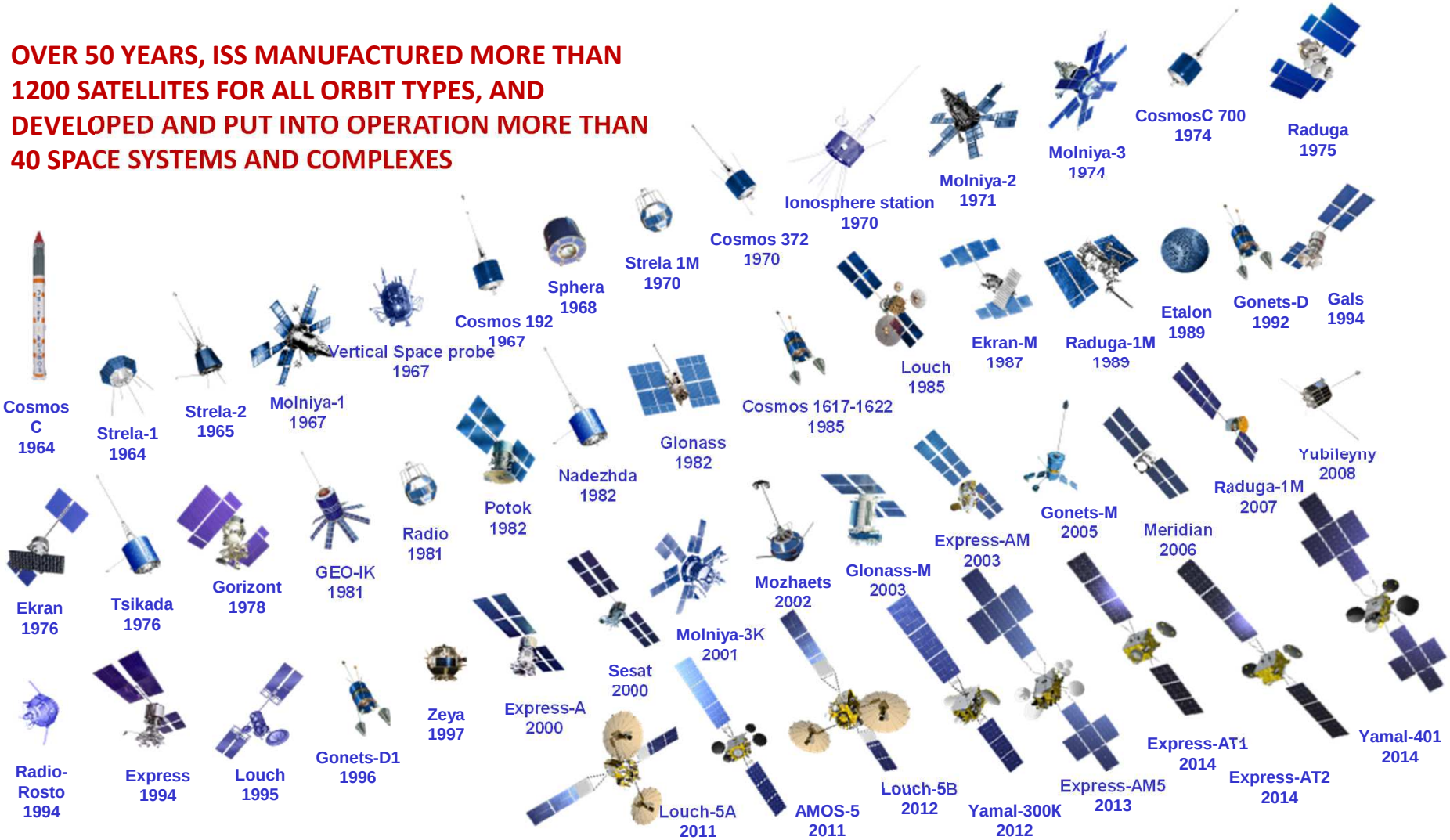
As for February 2015, the number of the ISS satellites in the Russian orbital constellation is 94.

KEY PROGRAMS

- Federal Space Program
- GLONASS Federal Program
- Military Satellite Program
- Commercial Contracts

KEY SATELLITE TYPES

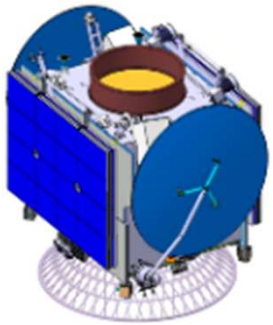
OVER 50 YEARS, ISS MANUFACTURED MORE THAN 1200 SATELLITES FOR ALL ORBIT TYPES, AND DEVELOPED AND PUT INTO OPERATION MORE THAN 40 SPACE SYSTEMS AND COMPLEXES



ISS GEO SATELLITES

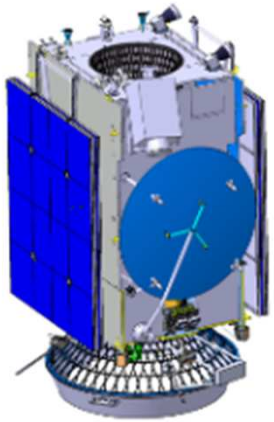
JSC «Information Satellite Systems» developed several types of platforms offered and used to build satellites of various classes and purposes for current programs of domestic and foreign customers.

Satellite based on EXPRESS-1000K Platform



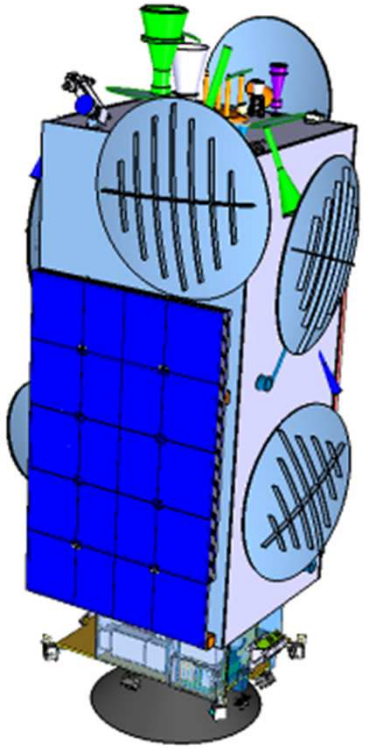
Express-AT2

Satellites based on EXPRESS-1000H Platform



AMOS-5, TELKOM-3, Yamal-300K, Lybid, KazSat , Express-AM8, Express-AT1

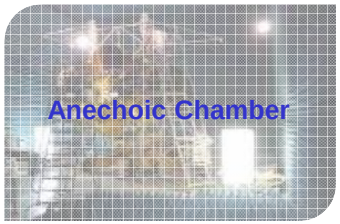
Satellites based on EXPRESS-2000 Platform

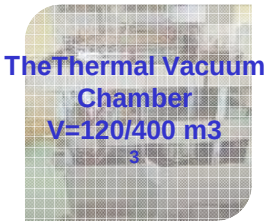


Express-AM5
Express-AM6
YAMAL-401

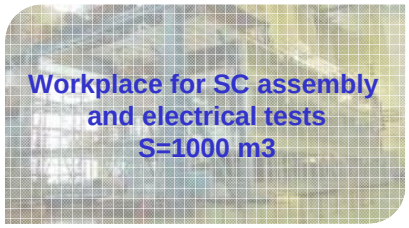
ISS TECHNICAL FACILITIES

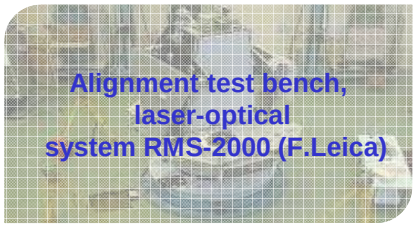
ISS-Reshetnev has the full range of manufacturing facilities ensuring the whole cycle of spacecraft manufacturing





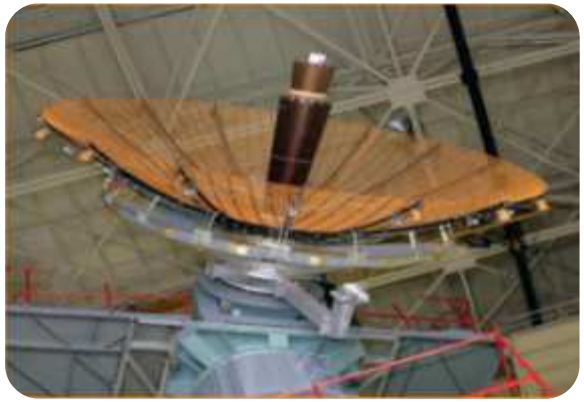
ALL REQUIRED FACILITIES AND EQUIPMENT TO BUILD SATELLITES





MANUFACTURING FACILITIES

Up-to-date and effective technologies have been mastered at ISS premises



Design and manufacturing of large shaped antennas

Use of polymeric composite materials with winding and impregnation machinery

Manufacturing of honeycomb panels with aluminum and composite skins

Autoclave

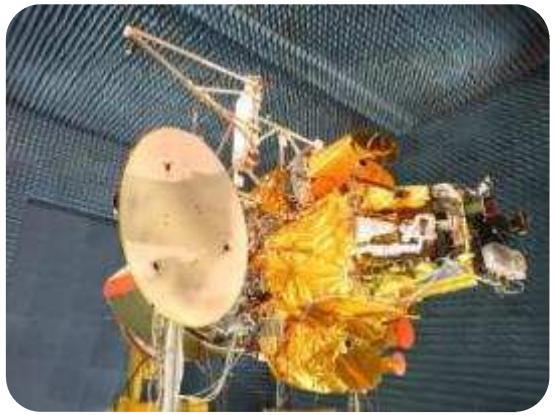
Facilities for reflectors metallization

TESTING FACILITIES

All required testing facilities and equipment items in site

TVAC chambers (600m^3, 400m^3, 180m^3)

Acoustic chamber (660m^3)



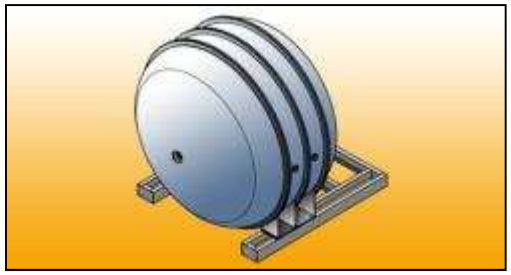
Anechoic chamber for EMC testing

Zero G test bench

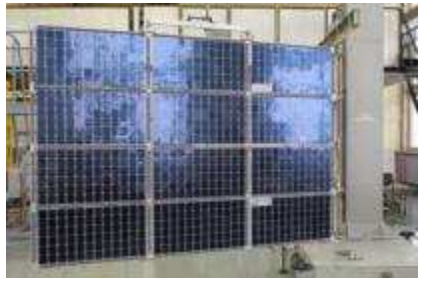
Vibration test bench

NANOTECHNOLOGIES FOR HARDWARE COMPONENTS PRODUCTION

Lightweight composite thermal control coating for OSR



Automated work place for large reflectors metallization



Solar Array based on Gallium Arsenide heterostructures

Flexible multi-purpose temperature-regulating material

Flexible transformed element of Satellite Attitude Control Subsystem

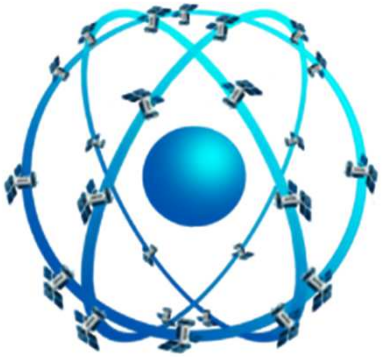
Automated work place for magnetron sputtering coating

Radio transparent thermal control material

Radar absorbing structural material

GLONASS SYSTEM SPACE COMPLEX

GLONASS SPACE COMPLEX ARCHITECTURE



GLONASS CONSTELLATION

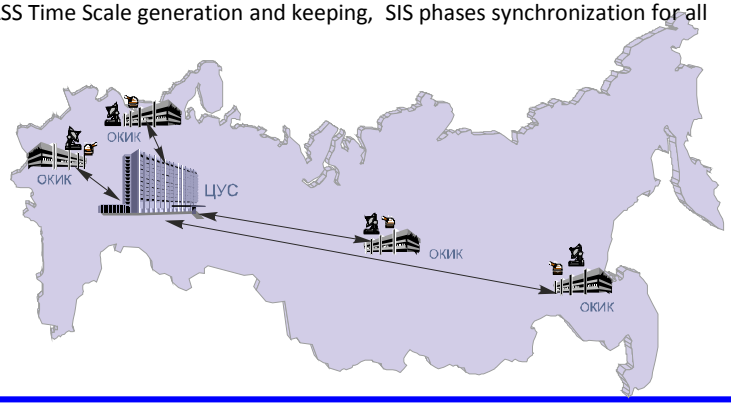
Generation and transmission of navigation signals
Orbit: circular, H=19140 km, I=64.8 degrees
Constellation: 24 operational satellites in 3 planes (8 satellites per plane)
6 spare satellites (2 satellites per plane)

LAUNCH VEHICLES

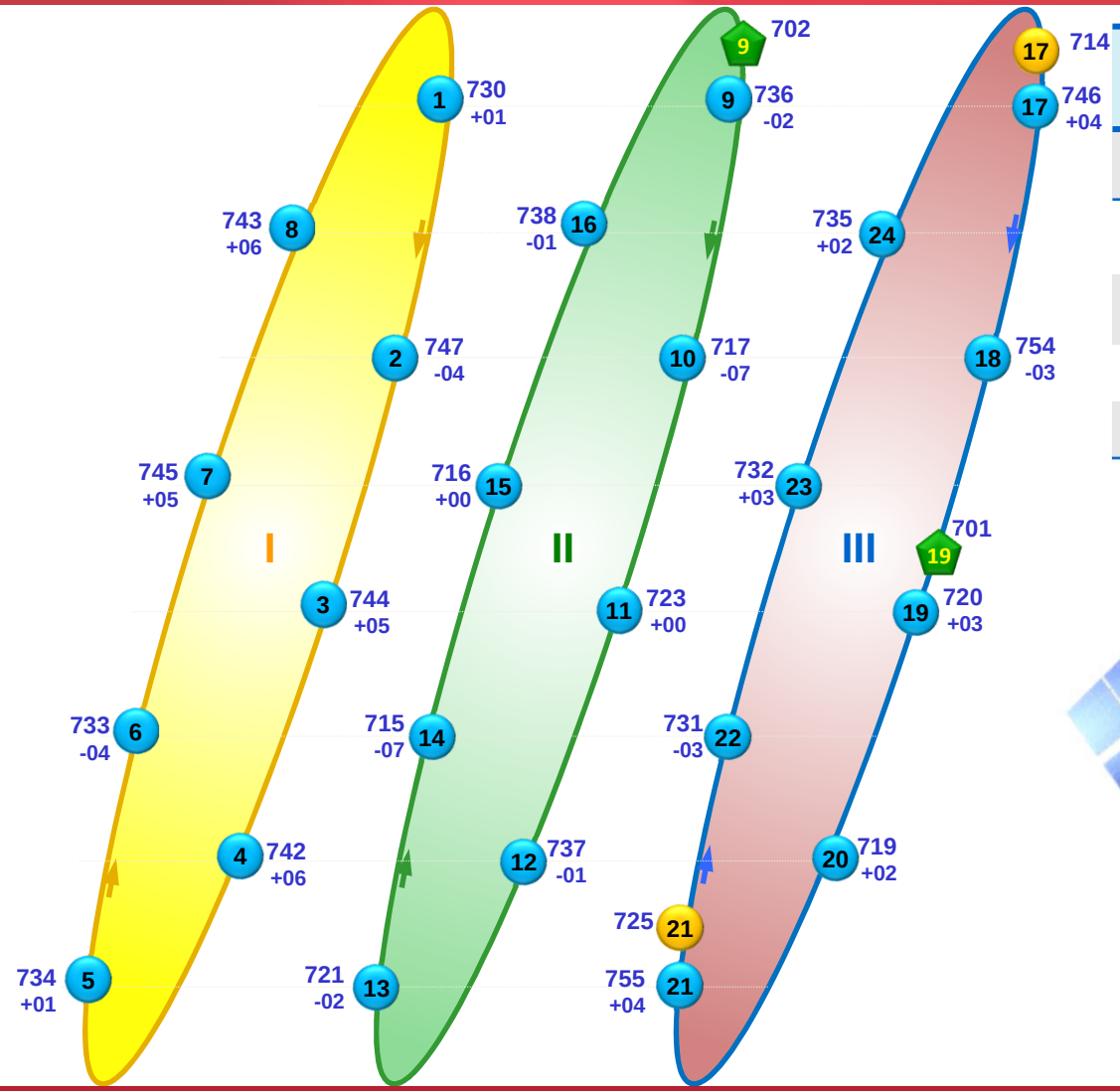
S/C launches, development and replenishment of the nominal orbital constellation

MODERNIZED GROUND COUND CONTROL SEGMENT WITH SYNCHRONIZATION FACILITIES

Satellite monitoring and control, satellite maintenance;
GLONASS Time Scale generation and keeping, SIS phases synchronization for all S/Cs



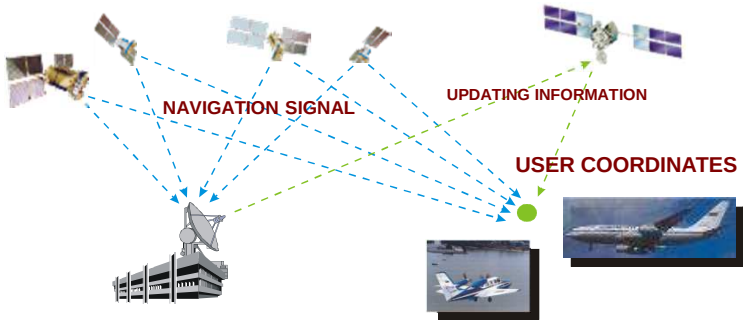
GLONASS CONSTELLATION



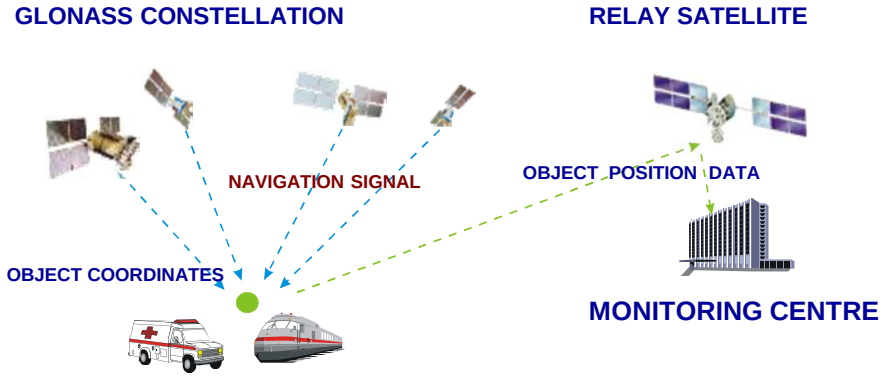
Status as of February 09, 2015.	
Total	28 S/C
Operational	24 S/C
Orbital spare	1 S/C
Under flight test	2 S/C
Under investigation	1 S/C

SPACE NAVIGATION TECHNOLOGIES FOR CIVIL USE

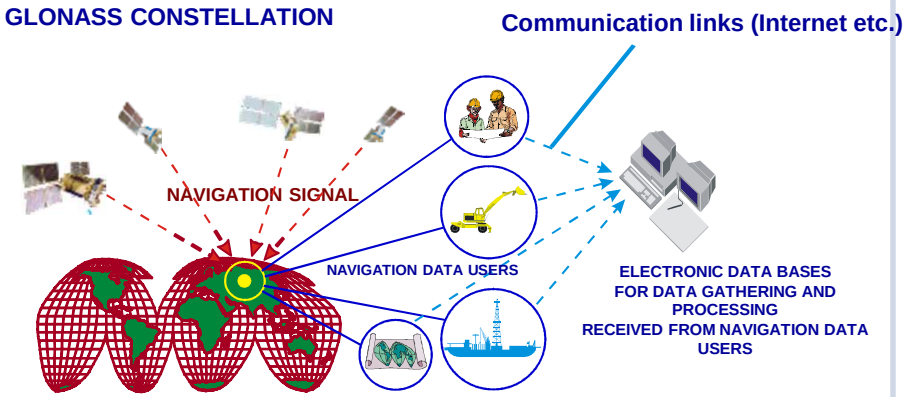
HIGH-PRECISION COORDINATE DETERMINATION



MONITORING OF OBJECTS



CARTOGRAPHY AND LAND USE



MONITORING OF EXTENDED OBJECTS CONDITION

The project of the motorway bridge structural monitoring for M-53 federal highway near Krasnoyarsk was designed and is in use currently.

Technology of bridge member control using GLONASS technology was proven under real-time testing.

Accuracy characteristics for relative motion of bridge reference points: 1-3 mm.

INTERNATIONAL WORKSHOP ON GNSS

UNITED NATIONS/RUSSIAN FEDERATION WORKSHOP ON THE APPLICATIONS OF GLOBAL NAVIGATION SATELLITE SYSTEMS/GLONASS

18-22 May, 2015, Krasnoyarsk

Session 1	CURRENT AND PLANNED GNSS AND SATELLITE-BASED AUGMENTATION SYSTEMS
Session 2	GNSS-BASED APPLICATIONS
Session 3	GNSS AND SPACE/ATMOSPHERIC WEATHER MONITORING
Session 4	GNSS REFERENCE FRAMES/SYSTEMS AND REFERENCE STATIONS NETWORKS
Session 5	CAPACITY BUILDING, TRAINING AND EDUCATION IN THE FIELD OF GNSS

CONTACT POINTS REGARDING PARTICIPATION:
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sharafat.gadimova@unoosa.org
United Nations Office for Outer Space Affairs

DISCUSSION SESSIONS
TECHNICAL TOUR TO the ZHELEZNOGORSK CITY AND VISIT TO ISS-RESHETNEV

12 KRASNOYARSK ECONOMIC FORUM

BRAINSTORMING ON THE TOPIC:

"SPACE AND TELECOMMUNICATION TECHNOLOGIES OF THE XXI CENTURY: RUSSIA'S PLACE IN THE MARKET OF HIGH TECHNOLOGIES"

REGISTRATION ON THE WEBSITE: WWW.KRASNOFORUM.RU

26-28 FEBRUARY, 2015, KRASNOYASK

29TH WORLD WINTER UNIVERSIADE 2019 IN KRASNOYARSK (WORLD STUDENT GAMES)

KRASNOYARSK 2019
29TH WINTER UNIVERSIADE

2-12 MARCH, 2019
KRASNOYARSK

WELCOME TO WINTER!

WELCOME TO COOPERATION!