

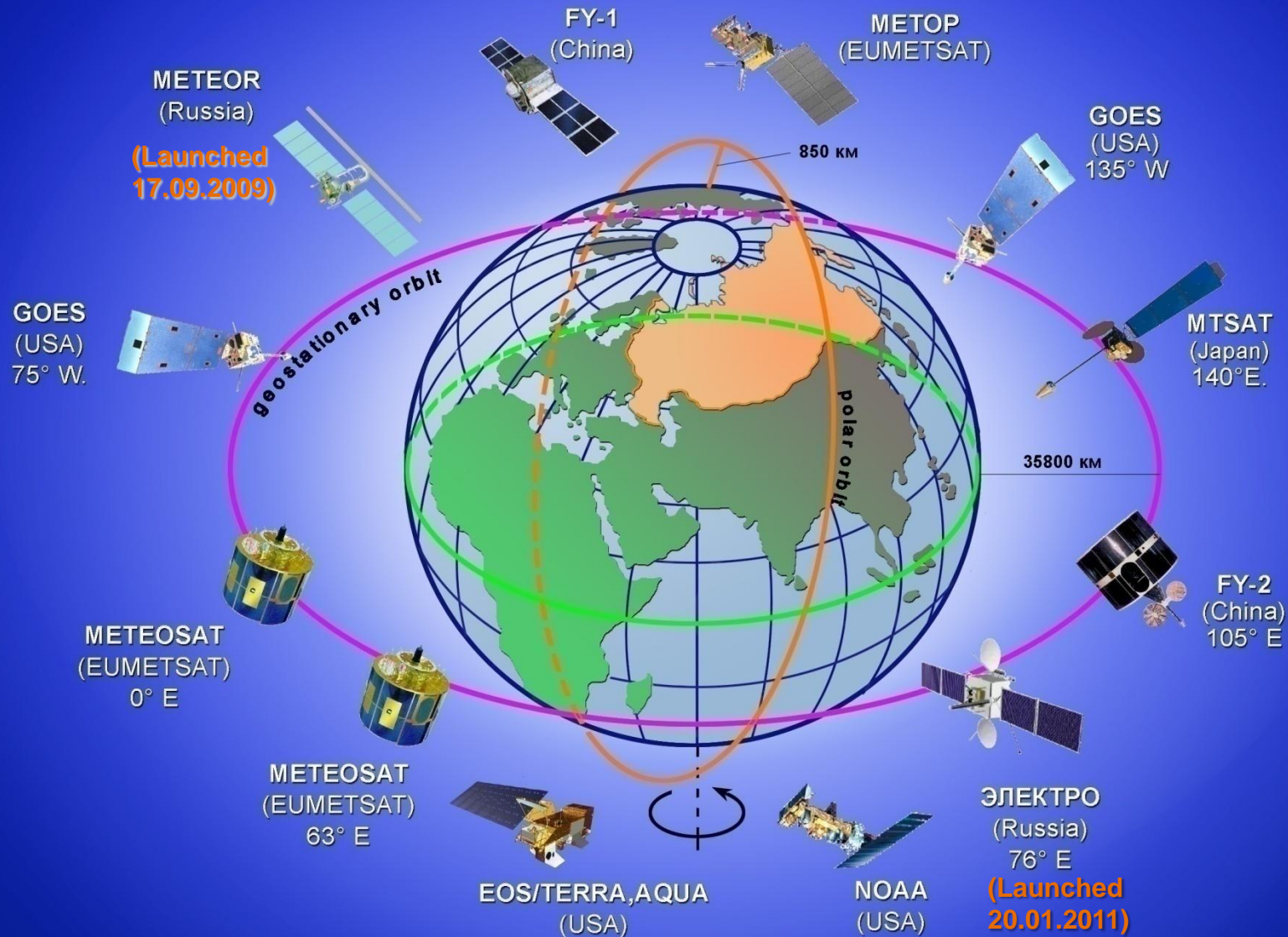
«Satellite data application at Roshydromet»

State Research Center for Space
Hydrometeorology «Planeta», Russia

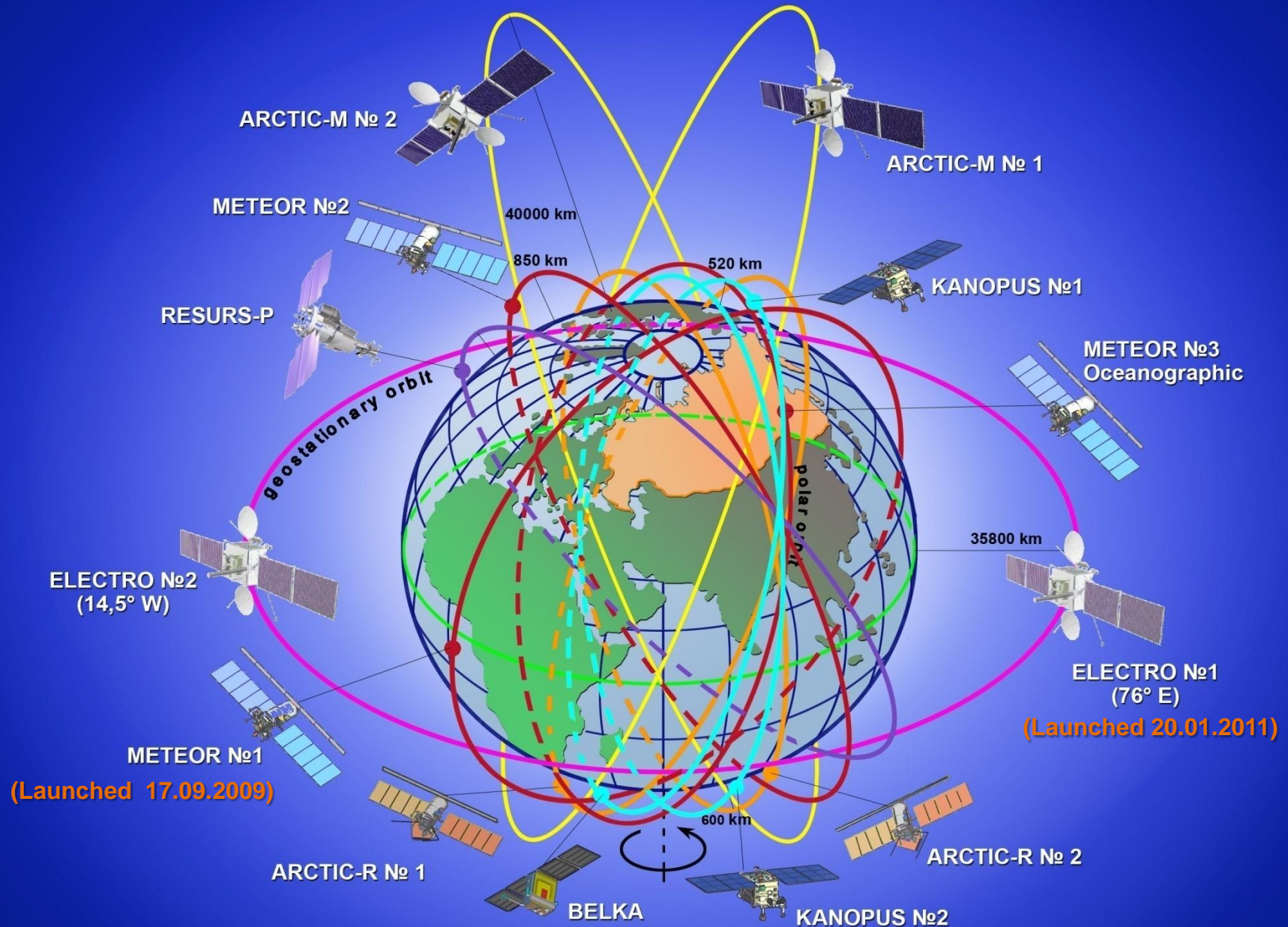
L. Kramareva, V. Asmus,
V. Krovotyntsev, V. Soloviev,
A. Uspensky



EARTH OBSERVATION SATELLITE SYSTEM



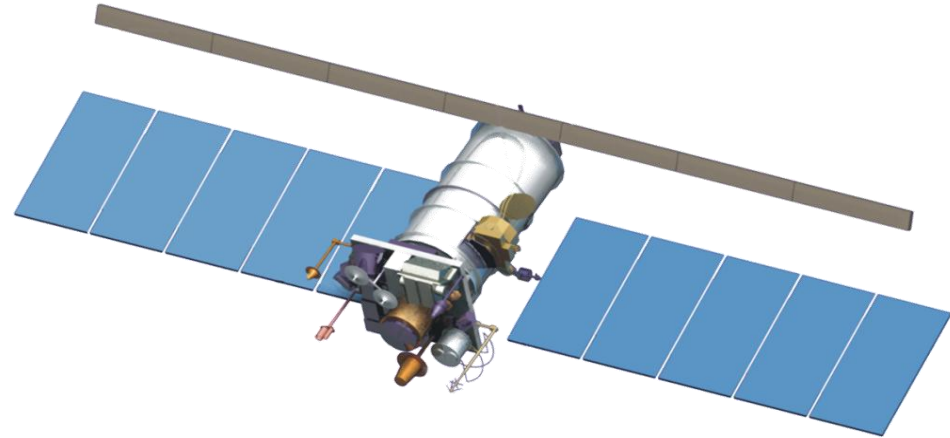
RUSSIAN EARTH OBSERVATION SATELLITE SYSTEM



METEOR-M General Design



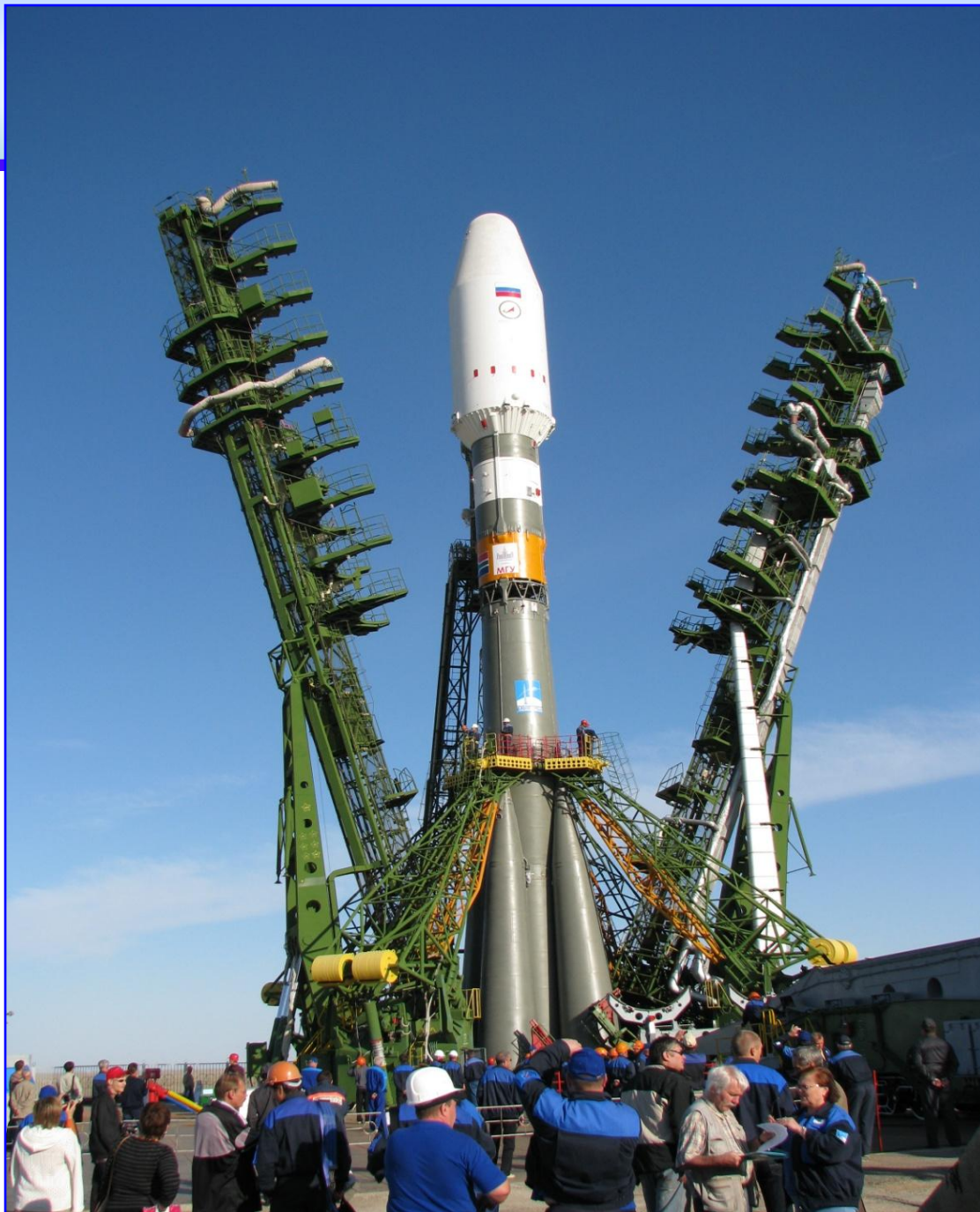
«Meteor-M» №1



- In-orbit mass – 2700 kg
- Payload mass – 1200 kg
- Lifetime – 5 years
- Orbit – Sun-synchronous
- Altitude – 830 km
- Data dissemination format – HRPT/LRPT



**SC "Meteor-M" № 1
on "Soyuz-2" Rocket**



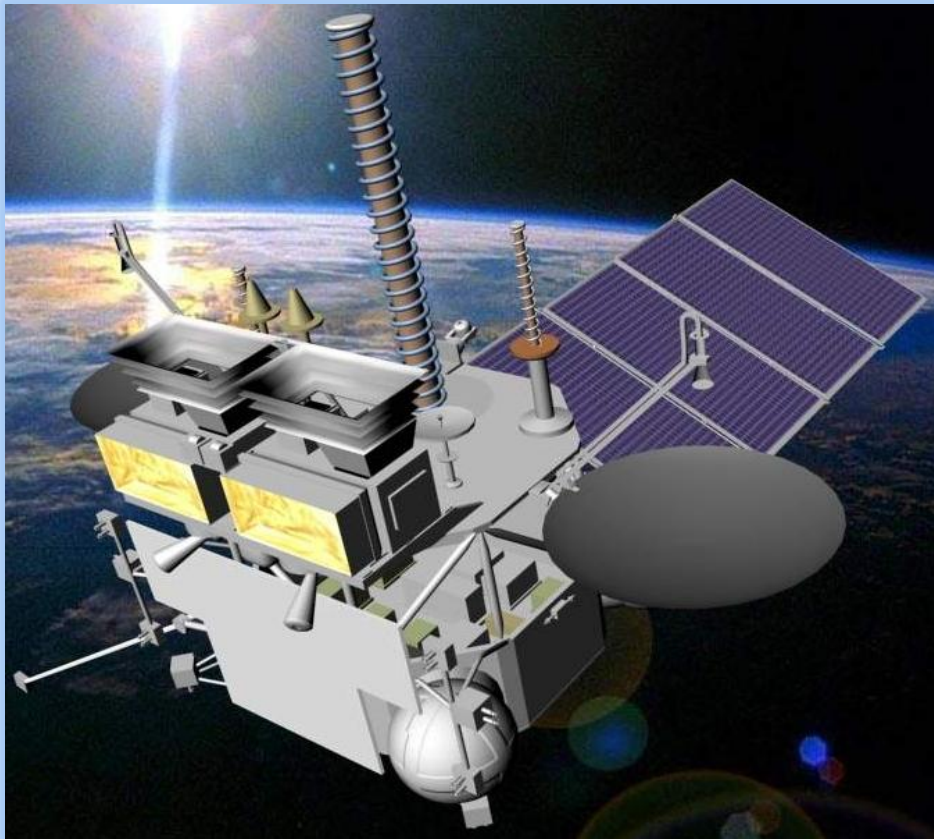
**The Rocket "Sojuz-2"
with SC "Meteor-M" № 1
on the Launch Position**

Meteor-M №1, №2 basic instruments specifications

Instrument	Application	Spectral band	Swath-width (km)	Resolution (km)
MSU-MR Low-resolution multi-channel scanning unit	Global and regional cloud cover mapping, ice and snow cover observation, forest fire monitoring, ...	0,5 – 12,5µm (6 channels)	3000	1 x 1
KMSS Visible spectrum scanning imager	Earth surface monitoring for various tasks (floods, soil and vegetation cover state, ice cover)	0,4-0,9 µm (3+3 channels)	450/900	0,05/0,1
MTVZA-GY Imager-sounder (module for temperature and humidity sounding of the atmosphere)	Atmospheric temperature and humidity profiles, sea surface wind	10,6-183,3 GHz (26 channels)	2600	12 – 75
IRFS-2 * advanced IR sounder (infrared Fourier-spectrometer)	Atmospheric temperature and humidity profiles	5-15 µm	2000	35
“Severjanin-M” Synthetic aperture radar	All-weather Ice coverage monitoring	9500-9700 MHz	600	0,4 x 0,5
GGAK-M Helio-geophysical suite	Helio-geophysical data providing			
BRK SSPD Data Collection System	Data retransmission from DCP			

* - to be installed on the board of Meteor-M № 2

ELECTRO-L General Design



- Three-axis high-precision stabilization
- In-orbit mass - 1500 kg
- Payload mass - 370 kg
- Lifetime - 10 years
- Longitude - 76E
- Data dissemination format - HRIT/LRIT
- Image repeat cycle – 30/15 min

Mission objectives

- Operational observation of the atmosphere and the Earth surface (MSU-GS)
- Heliogeophysical measurements
- Maintaining Data Collection System and COSPAS/SARSAT Service

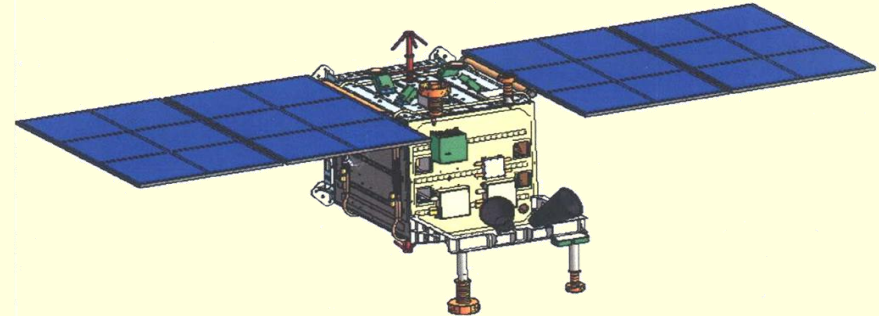
MSU-GS Basic Performance Characteristics

Number of channels	10
• VIS	3
• IR	7
Spectral range at half maximum of spectral response function (μm)	0.5-0.65; 0.65-0.80; 0.8-0.9; 3.5-4.0; 5.7-7.0; 7.5-8.5; 8.2-9.2; 9.2-10.2; 10.2-11.2; 11.2-12.5
Image frame (deg x deg)	$20 \pm 0.5 \times 20 \pm 0.5$
HRIT ground resolution in sub satellite point (km)	1.0 (VIS); 4.0 (IR)
S/N ratio for VIS channels	≥ 200
NE Δ T at 300K (K)	
• in the band 3.5-4.0 μm	0.8
• in the band 5.7-7.0 μm	0.4
• in the band 7.5-12.5 μm	0.1-0.2
Power (W)	≤ 150
Weight (kg)	≤ 88
Lifetime of basic and reserve units (years)	10

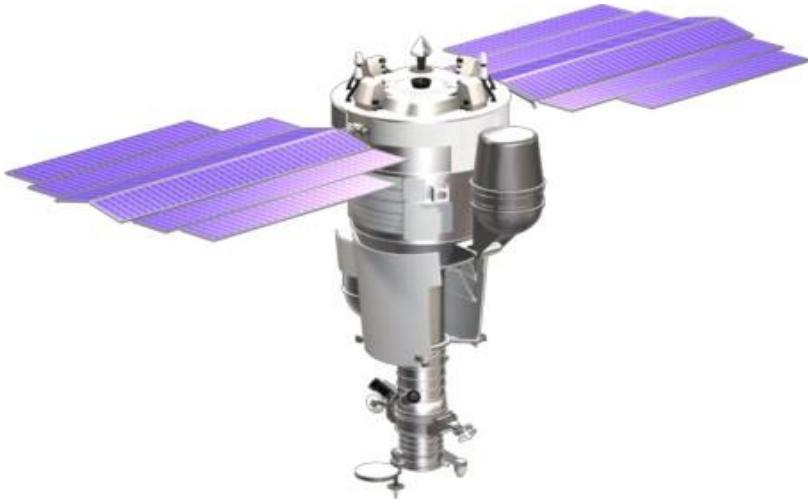
KANOPUS-V General Design

Main characteristics :

- In-orbit mass – 350 kg
- Payload mass – 147 kg
- Orbit altitude – 510-600 km
- Inclination – 98°
- Lifetime – 5-7 years
- To be launched – 2011
- Spectral bands:
 - 0,52-0,85 μm (panchromatic system)
 - 0,54-0,60; 0,63-0,69; 0,69-0,72; 0,75-0,86 μm (multi spectral system)
- Space resolution
 - panchromatic system – 2,7 m
 - multi spectral system – 12,0 m
- Swath Width – 20,0 km



RESURS-P General Design



- In-orbit mass - 6570 kg
- Payload mass - 1200 kg
- Lifetime - 3 years
- Orbit – elliptical, H=360-604 km
- Inclination – 70,4°

RESURS-P Observation Parameters

Swath Width	-	28,3 / 448 km
Spectral Bands	-	0,58-0,8; 0,45-0,5; 0,55-0,59; 0,65-0,68; 0,72-0,75; 0,75-0,78; 0,78-0,9; 0,9-1,1 μm
Resolution		
panchromatic system	-	1 m
multi spectral system	-	2-3 m

Planned time launch - up to 2013



**Federal Service for Hydrometeorology
and Environmental Monitoring**



**Russian Federal
Space Agency**

High-elliptical Orbital Satellite System "Arctica-M"

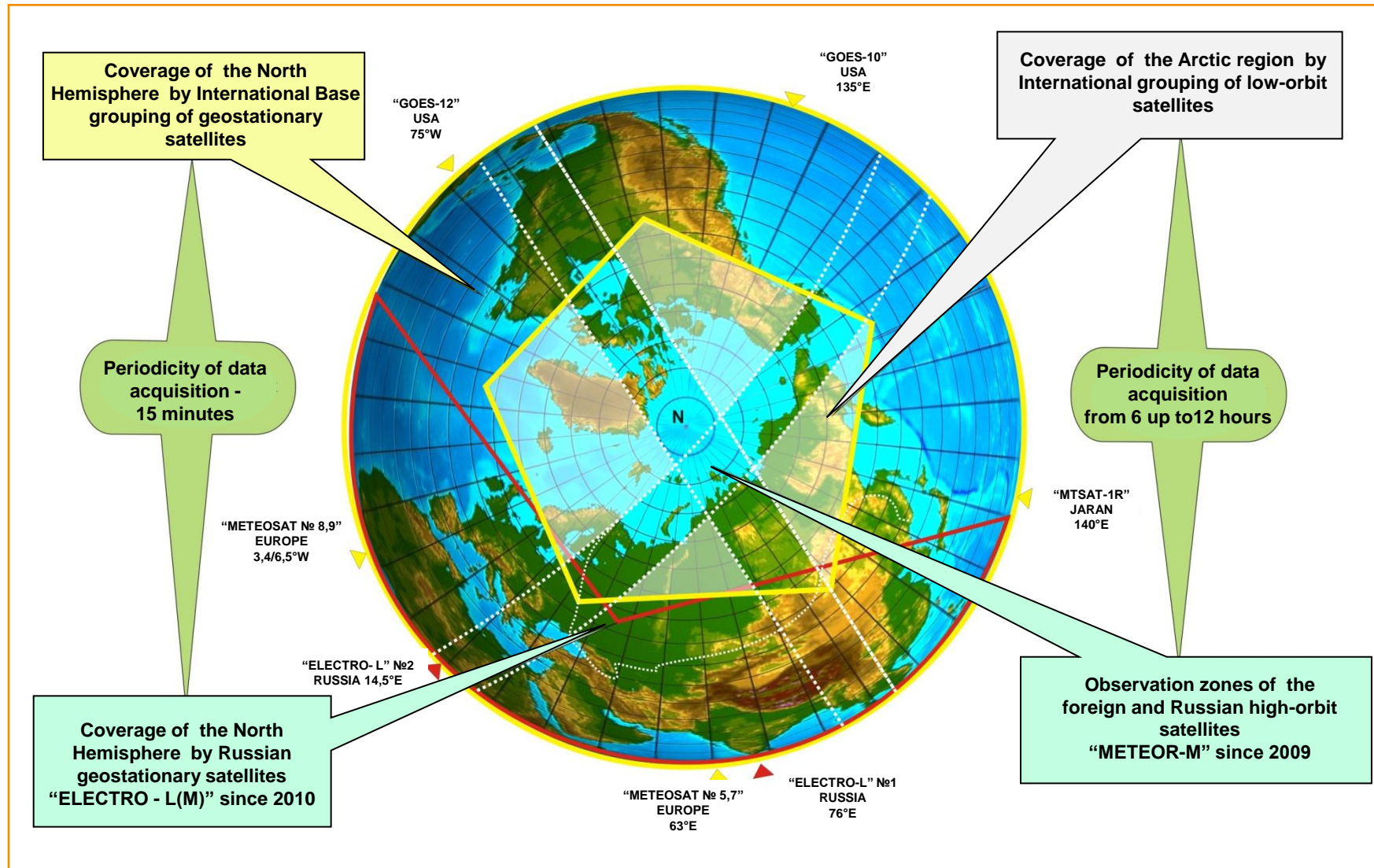


**State Centre on Space
Hydrometeorology "Planeta"**



Lavochkin Association

Earth Observation by the International Meteorological Satellite System



Main Tasks and Applications

Utilization for analysis and forecasting :

- weather in the regional (Arctic) and global scales
- ice cover in Arctic
- flight conditions for aviation (cloudiness, wind, jet-streams etc.)
- snow cover
- heliogeophysical conditions in the near Earth Space

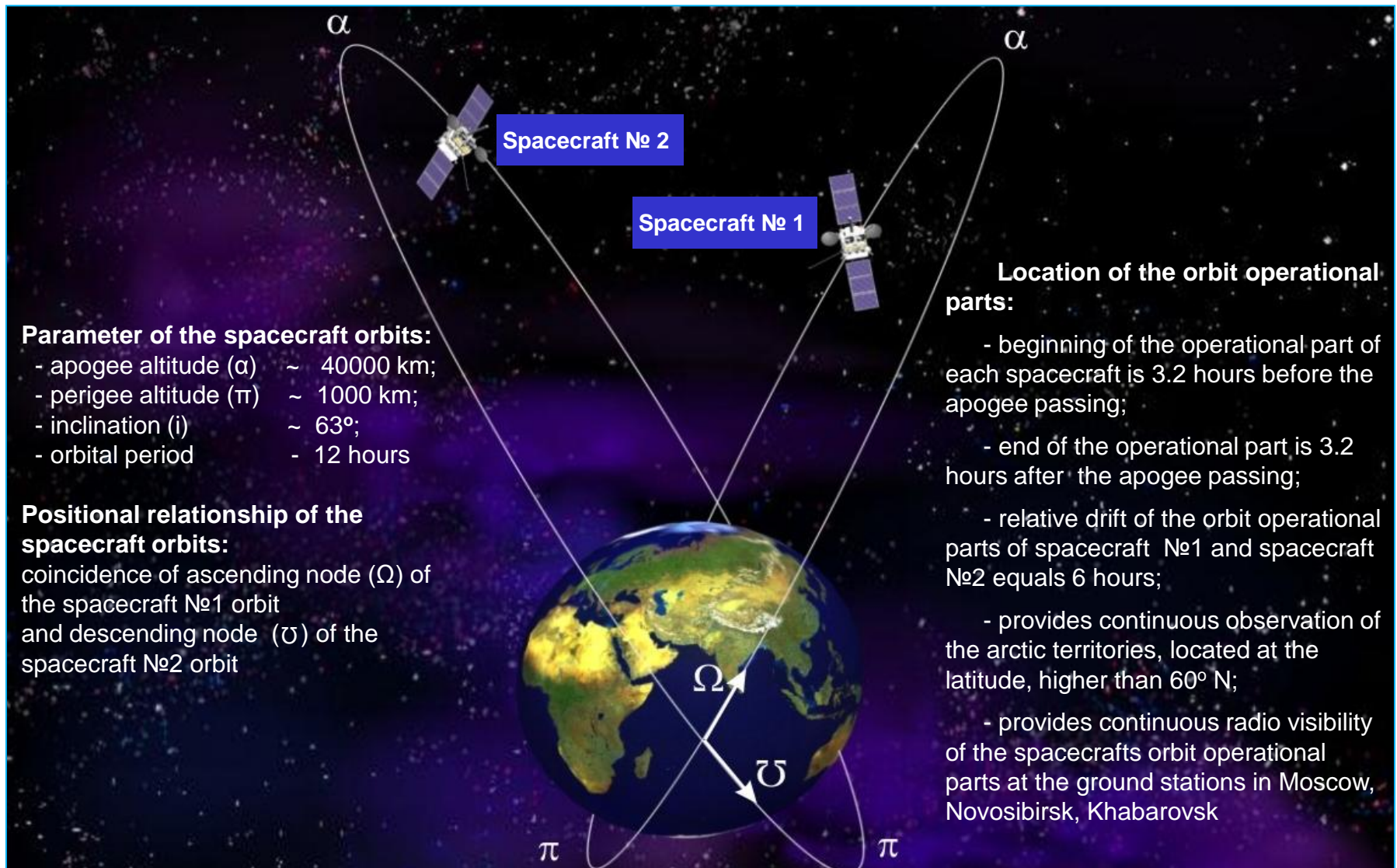
Monitoring of disasters (fires, floods, volcanic eruptions etc.)

Monitoring of climate change

Data collection and relay from land-, sea- and air-based observing platforms

Exchange and dissemination of processed satellite, meteorological and heliogeophysical data

Ballistic Configuration of the Space System



Ground System of Receiving, Processing, Archiving and Distribution of Roshydromet Satellite Data

Ground Complex of Data Reception, Processing, and Dissemination includes 3 Regional centers of the federal level (European, Siberian and Far Eastern), ensuring ***closed and continuous*** (24h x 365 days) technological cycle of planning, reception, registration, processing, cataloging, storage, and securing the users with the data of hydro meteorological and geophysical condition, 68 autonomous reception stations, distributed all over Russia, including stations in Antarctic and expedition vessels.

Ground Complex of Data Reception, Processing, and Dissemination as to the amount of received data (over 280 Gb/a day), information product mix (over 150 products a day), the number of users (over 460 users at federal and regional level, including Roshydromet, Defense Ministry, Ministry for Emergencies, Russian Academy of Science and others) is the **largest** in Russia and one of the largest in the world, and as to the coverage by real time monitoring of the Earth surface (over 1/5 of the land surface) – **the largest in the world**.

All regional centers are equipped with **certified** reception stations including antennas with the diameter of 9 and 12 meters which allow to receive any high speed data streams from Remote Earth Sensing Spacecraft.

Regional centers and autonomous stations of Ground Reception, Processing and Dissemination Complex are combined into a unified information system.

Ground segment of Satellite Earth Observation System

Regional Centers:

European

(SRC Planeta, Moscow-Obninsk-Dolgoprudny)

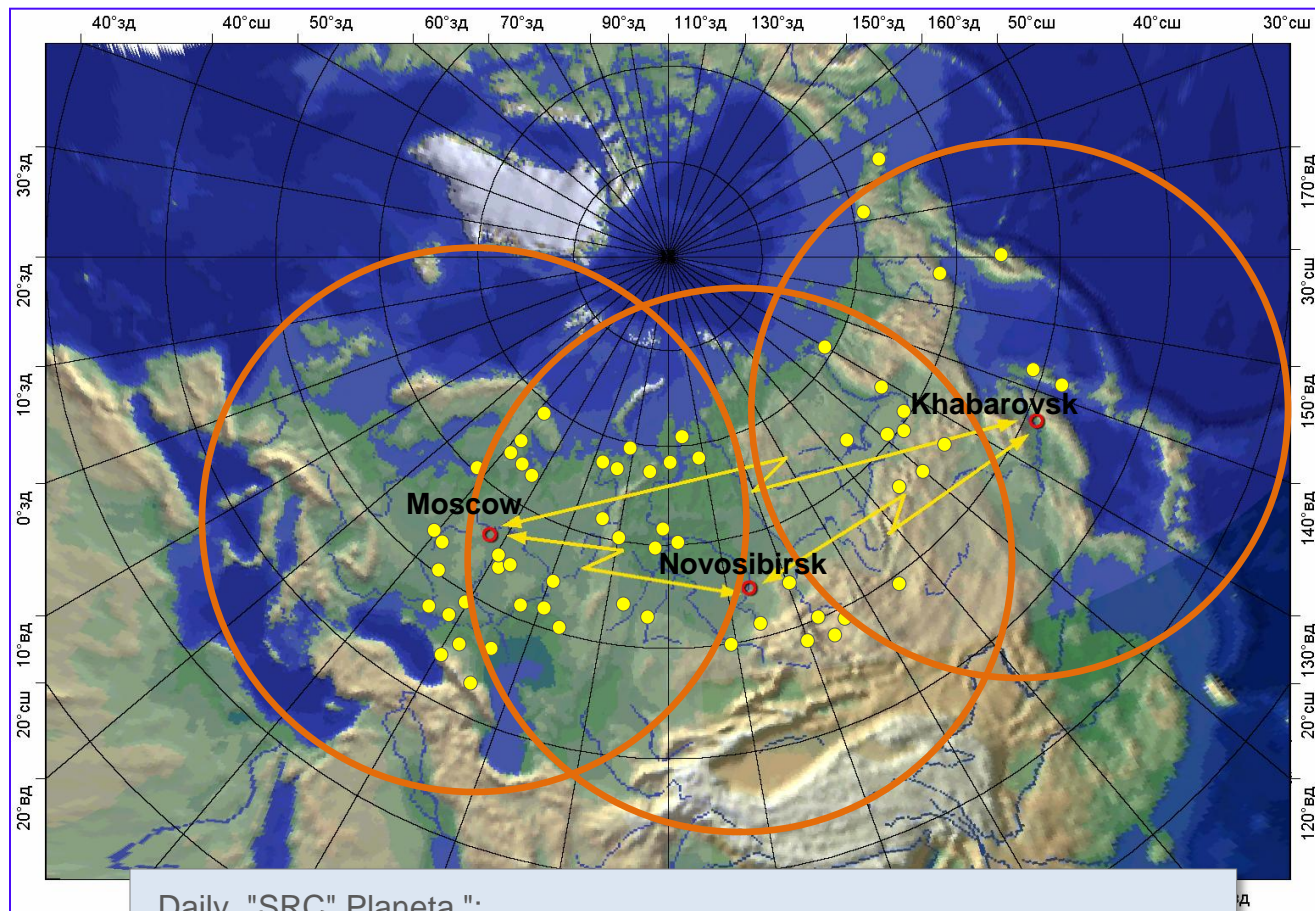
Siberian

(SRC Planeta, Novosibirsk)

Far-Eastern

(SRC Planeta, Khabarovsk)

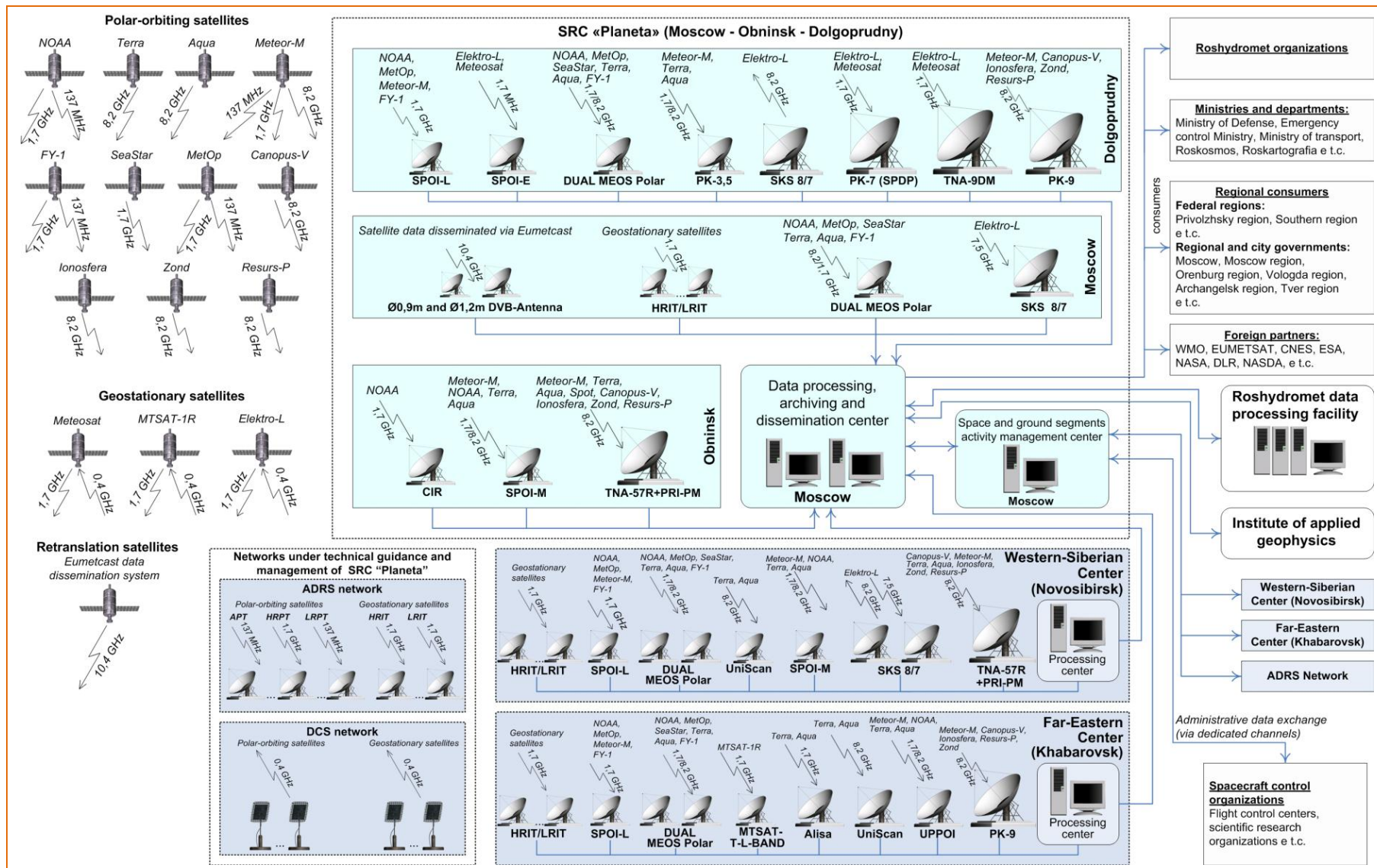
● - 68 local centers



Daily "SRC" Planeta ":

- receives more than 280 GB of satellite data;
- produces more than 150 types of information products;
- provides to more than 460 consumers at federal and regional levels

Roshydromet Ground System of Receiving, Processing, Archiving and Distribution of Satellite Data



SRC «PLANETA» receiving stations in Moscow region



СПОИ-Э HRIT – 3 sets



СПОИ-Э LRIT – 7 sets



DUAL MEOS Polar



CKC-8,2



ПК-7



ТНА-9ДМ



ПК-9

ДОЛГОПРУДНЫЙ



DVB – антенны 0,9 и 1,2 м



DUAL MEOS Polar



CKC-7,5

МОСКВА



СПОИ-М



ТНА-57Р (ПРИ-ПМ)



Terminal GM

ОБНИНСК

SRC «PLANETA» receiving stations in Siberia



DUAL MEOS Polar



Uni Scan



CKC 8/7



СПОИ-М



ТНА-57Р (ПРИ-ПМ)

SRC «PLANETA» receiving stations in the Far East



DUAL MEOS Polar



MTSAT-T-L-BAND



Алуца



Uni Scan

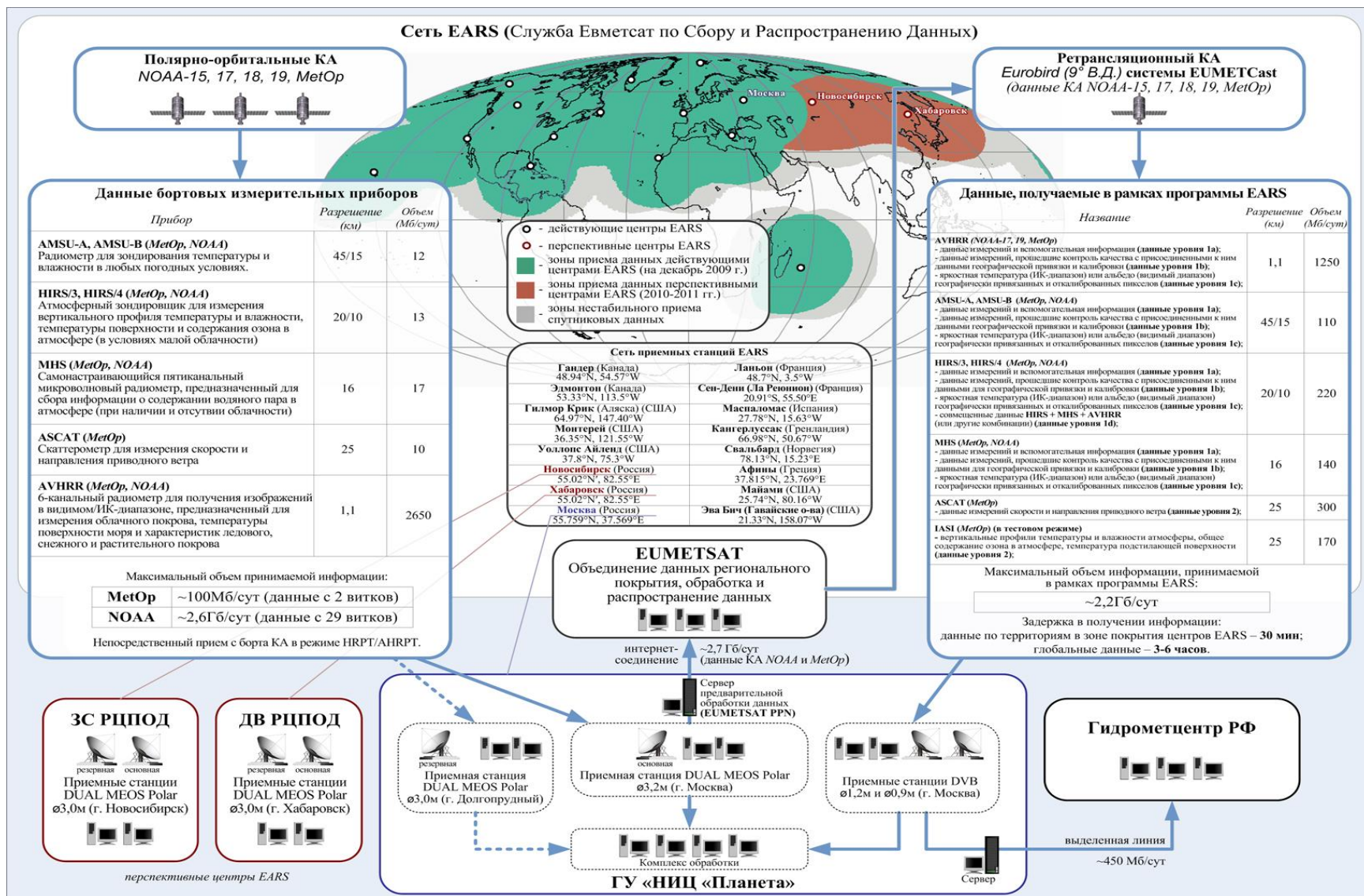


УППОИ



ПК-9

Roshydromet and EARS



EARS data usage :

- extends the earth's area coverage with satellite information;
- reduces the time of receiving satellite data in forecasting centers

SRC "Planeta"

products available via Internet:

Operative products:

<http://planet.iitp.ru>

Satellite data:

<http://sputnik1.infospace.ru>

Climatic data:

<http://seakc.meteoinfo.ru>

<http://neacc.meteoinfo.ru>



***Thanks for your
attention!***