

Future Polar Orbiting Meteorological Satellite Systems

“METEOR-M” A NEW STAGE OF RUSSIAN OPERATING METEOROLOGICAL SATELLITES

Summary and purpose of the WP

In Russian Federation it is in progress creating a new spacecraft “Meteor-M” that is the first satellite of a new generation of Russian hydro-meteorological polar-orbiting satellites.

The spacecraft has got a wide range of onboard device including not only meteorological instruments but some additional observing devices for remote sensing of the Earth and to measure helio-geophysical parameters.

Action proposed: no action required.

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METEOROLOGICAL SATELLITES**

In Russian Federation based on Federal Space Program of Russia there are conducted works on creation of “Meteor-M” spacecraft (SC) – a new generation of hydro- meteorological polar-orbital satellites.

SC “Meteor – M” is created on the basis of a well-known in spacecraft series of “Resource-01” unified space platform, which received the name “Resource-USP”.

SC “Meteor-M” is designed to:

- acquire multi-spectral images, including radar images, as well as radiation measurement data of the system “earth surface –atmosphere” in different bands of energy distribution spectrum in terms of absolute energy values;
- acquire helio- geophysical information;
- collect and transmit data from independent measuring platforms (ground, ice, drift).

The data acquired from SC “Meteor-M” will be used to solve the following main tasks:

- regional and global weather analysis and prediction;
- analysis and prediction of sea and ocean water area state;
- analysis and prediction of gelio-geophysical situation in near-earth space, state of ionosphere and Earth’s magnetic field;
- climate and global changes monitoring;
- extreme situation control;
- ecology environment control.

SC “Meteor-M” will be put into sun-synchronous orbit with the following parameters:

- medium orbit altitude in equator 832 km,
- inclination 98,068 deg;
- period of revolution 101,306 min.

The Information Complex of “Meteor-M” SC shall include the following instruments:

1. Low Resolution Multi-Spectral Scanner (MSU-MR), spectral channel number – 6, spatial resolution – 1 km, swath width – 2800km;

2. Onboard Radar Complex (OBRC) with two modes of observation: 1) for resolution 400-500 m, 2) for resolution 700-1000 m, swath width – 600 km;

3. Multi-channel Spectral Imaging System (KMSS) with medium resolution 50 or 100 m, spectral channel number – 6, swath width – 400 or 900 km;

4. System for acquiring thermodynamic atmosphere data which includes:

- atmosphere temperature and humidity sounding module (MTVZA) – microwave radiometer, number of channels – 29, operating frequency - 6,9 - 183,31 GHz, spatial resolution - 10 - 100 km;

- equipment for atmosphere temperature and humidity sounding in IR-band – Fourier spectrometer, spectral resolution (digitisation interval) - $0,25 \text{ cm}^{-1}$, spectral diapason - 5-15 μm ;

Note: Fourier spectrometer will be installed beginning with SC “Meteor” № 2.

5. Helio and geophysical observation facility including:

- multi-channel geoactive corpuscular radiation spectrometer
- solar cosmic rays spectrometer
- galactic cosmic rays detector
- radiofrequency mass spectrometer
- advanced Earth reflected short-wave radiation meter.

6. Onboard information system

7. Onboard radiocomplex for collecting and transmitting data from ground observation platforms.

Data collection and transmission system should provide:

- onboard processing of signals with frequency-time multiplexing including demodulation, preliminary processing, storage and transmission in batch flux of OBIS special purpose information.

- fixation of Doppler frequency shift measurement of received signal to onboard time and storing data in RAM with capacity which provides to store data no less 3 hours.

The use of international ranges and generally accepted data transmission formats LRPT and HRPT in radio line “board-earth” allow the information from “Meteor-M” SC to be accessible for international community.

Therefore “Meteor-M” SC is considered as a component of space subsystem of the Global Observation System of the World Meteorological Organization.

“Meteor-M” SC is a multi-purpose satellite that is evident from Onboard Informational Complex complement. Onboard Radar Complex and one of the KMSS cameras (with focal distance 50mm) make it possible to observe sea surface. The two others cameras are designed for ground surface observation. Obtained data will be used for Earth nature resources research.

“Meteor-M” SC is assumed to be manufactured in 2006. The launch is expected by the end of 2006. Service life - no less than 5 years.