Future Polar Orbiting Meteorological Satellite Systems

REPORT ON FUTURE POLAR ORBITING METEOROLOGICAL

SATELLITE SYSTEM METEOR-3M

Summary and purpose of document

The purpose of this document is to present the current status of
preparation of future Russian polar orbiting meteorological system METEOR-3M

Action

No action required

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The works are continued on the development of next series of Russian polar orbiting meteorological satellites of Meteor-3M series. The launch of the satellites on sun-synchronized orbit is planned in June 2000 and August 2002 respectively.

The orbital parameters of these satellites are the following:

Table 1

Satellite	Inclination, deg.	Altitude, km	Period, min	Ascending node equator crossing time
Meteor-3M N1	99.6°	1024	105.3	09:15
Meteor-3M N2	99.6°	1024	105.3	10:30 (16:30)

The payload of Meteor-3M N1 satellite (given below in table 2) includes scanning instruments of visible and IR range MR-2000M (similar to those at Meteor-3), KLIMAT-2 (modernized scanning IR radiometer KLIMAT installed on board Meteor-3). For imaging and sounding missions Meteor-3M N 1 will carry the microwave (MW) scanning radiometer MIVZA (5 channels in the range 18-90 GHz). Sounding mission will be supported with MW radiometer MTVZA (20 channels in the range of 18.7-183.36 GHz). This instrument will provide data for atmospheric temperature and humidity soundings as well as for oceanographic researches such as microwave diagnostics of the active ocean layer processes.

INSTRUMENT PAYLOAD OF METEOR-3M N 1 SATELLITE

Table 2

Instrument	Application	Spectral Band	Swathwidth, km	Resolution, km
MR-2000M	Cloud cover mapping	0.5 - 0.8 μm	3100	0.7 * 1.4
KLIMAT-2	Cloud cover mapping, SST	0.65 – 1.0 μm 10.5 - 12.5 μm	3000	3 * 3
MIVZA	Total humidity of the atmosphere	20.0 35.0 94.0 GHz (5 channels)	1500	80 – 40
MTVZA	Atmospheric temperature and humidity profiles	18.7; 22.2; 33.0; 36.5; 42.0; 48.0; 52.3-56.0; 91.65; 183.3 GHz (20 channels)	2600	75 – 15
MSU-E	Multispectral images of high spatial resolution	0.5 – 0.6 μm 0.6 – 0.7 μm 0.8 - 0.9 μm	45	45 m
SAGE III	Profiles of aerosols ozone, NO_2, etc.	0.29 - 1.55 μm (9 channels)		1 - 2 (vertical)
SFM-2	0_3 vertical distribution	ultraviolet		
KGI-4	Space environmental monitoring	Protons, electrons, Alpha particles, ions fluxes		
MSGI-5	Space environmental monitoring	Geo-active irradiances		

The updated summary of payload of Meteor-3M N1 and M2 is given in Table 3. New sensors for imaging and sounding mission are planned to install on board of Meteor-3M N2. Those are:

- multichannel scanning radiometer MSR (4 channels in visible and IR, similar to channels 1,2,4,5 of AVHRR, spatial resolution is close to 1 km).

- advanced IR atmospheric sounder IRFS based on Fourier transform spectrometer (spectral range of 2 – 4.5 μm and 5.0 – 16 μm; spectral resolution is equal or better than 0.5 cm $^{-1}$. The IRFS primary mission is to provide data on temperature and humidity profiles and to meet WMO requirements on vertical resolution and accuracy of sounding in the troposphere.

The SAGE-III (USA, NASA) sensor is planned to be installed on board of Meteor-3M N1 satellite (in frame of the agreement between NASA and RSA).

Both satellites of Meteor-3M series will allow standard 1.7 GHz downlink channel. HRPT mode is foreseen on Meteor-3M N2.

METEOR-3M SATELLITES PAYLOAD COMPOSITION SUMMARY

Table 3

Instruments mission and name	Meteor-3M N 1	Meteor-3M N 2
Imaging mission Multispectral scanning systems	MR 2000M KLIMAT-2 MIVZA MSU-E	MSR** MZOAS**
Sounding mission Advanced multispectral sounders	MTVZA*	MTVZA IRFS*
Heliogeophysical mission SEM	KGI-4 MSGI-5	KGI-4 MSGI-5
Optional mission Trace gases monitoring	SAGE III (USA) SFM-2	TBD

Notes: *   The pre operational mission
        ** The pre operational mission is performed in case of successful ground tests