**CGMS-XXXII ROSS-WP-1**
**Prepared by Russia**
**Agenda Item: C.1**

# Future Polar–Orbiting Meteorological Satellite Systems

## PROSPECTIVE RUSSIAN METEOROLOGICAL POLAR–ORBITING SATELLITE "METEOR-M"

Summary and purpose of the WP

A new Russian meteorological satellite "Meteor-M" is designed to acquire a lot of meteorological and land-observing information.

Various multispectral imagers, a microwave radiometer, an onboard radar station, a Fourier-spectrometer, helio-geophysical facilities and a radiocomplex for collecting and transmitting data from ground observation platforms will be placed on this spacecraft.

The satellite is planned to be launched in 2006.

**Action proposed: no action required.**

## PROSPECTIVE RUSSIAN METEOROLOGICAL POLAR–ORBITING SATELLITE "METEOR-M"

Russian Federal Space Agency is developed a new meteorological satellite "Meteor-M". It 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).

"Meteor-M" will be launched in 2006 into a sun-synchronous orbit at an altitude 832 km and inclination 98,068°

The Information complex of "Meteor-M" shall include the following instruments:

1. Low Resolution Multi-Spectral Scanner (MSU-MR);

2. Onboard Radar Complex (OBRC);

3. Multi-channel Spectral Imaging System (KMSS) with medium resolution.

4. Atmosphere temperature and humidity sounding module (MTVZA) – microwave radiometer;

5. Fourier-spectrometer.

6. Helio and geophysical observation facilities.

The above-listed equipment has the following main characteristics.

## Low resolution multi-spectral scanner (MSU-MR)

| n/n | Parameter | Value |
|---|---|---|
| 1. | Spectral channel number | 6 |
| | Nominal values of spectral bands border in level 0.5mkm<br>I channel<br>II channel<br>III channel<br>IY channel<br>Y channel<br>YI channel | <br>0.50?0,2-0.70?0,2;<br>0.70?0,2-1.10?0,2;<br>1.60?0,5-1.80?0,5;<br>3.50?0,5-4.10?0,5;<br>10.5?0,5-11.5?0,5;<br>11.5?0,5-12.5?0,5 |
| 2. | Scanning geometry-plane, scanning angle, deg | $108^0$ (? $54^0$) |
| 3. | Swath width (imaging with 832km orbit), km | ?2800 |
| 4. | Angular resolution in all spectral channels, mrad | 1,2+0,2 |
| 5. | Spatial resolution (Earth pixel projection size when imaging with 832km altitude in nadir), km | ?1.0 |

## Onboard Radar Complex (OBRC)

Onboard radar complex has a transceiver with radiance signal vertical polarization.

| n/n | Parameter | Value |
|---|---|---|
| 1. | Carrier frequency of sounding signal, MHz | 9623,125 ? 1,25 |
| 2. | Imaging bandwidth, km | 600 |
| 3. | Minimum/maximum imaging angle (from vertical), deg | 25/48 |
| 4. | Linear resolution in medium resolution mode, m | 400-500 |
| 5. | Linear resolution in low resolution mode, m | 700-1000 |

## Multi-channel spectral imaging system (KMSS)

KMSS comprises of three cameras, the two cameras have a focal distance 100 mm, the third one has a focal distance 50 mm/

| n/n | Parameter | Value |
|---|---|---|
| 1. | View width, km | 400, 900 |
| 2. | Field of view angle, deg | 31, 62 |
| 3. | Resolution, m | 50, 100 |
| 4. | Number of spectral bands | 6 |

## Atmosphere temperature and humidity sounding module (MTVZA)

| n\n | Parameter | Value |
|---|---|---|
| 1. | View width, km | 1500 |
| 2. | Number of channels | 31 |
| 3. | Operating frequency, GHz | 6,9 - 183,31 |
| 4. | Patial resolution (depending on frequency channel), km | 100 - 10 |
| 5. | Vertical resolution, km | 4 - 5 |
| 6. | Sensitivity in resolution element, K | 0,5 |

## Fourier-spectrometer for atmosphere temperature and humidity sounding

| | | |
|---|---|---|
| 1. | Operating spectral band, ? m | 5-15<br>(? = 2000…667 $sm^{-1}$) |
| 2. | Spectral resolution (width of isolated spectral line with half line height) | 0,5 |
| 3. | Digitisation interval, $sm^{-1}$ | 0,25 $sm^{-1}$ |

## Helio and geophysical observation equipment system

| | | |
|---|---|---|
| 1. | Measurements:<br>- electrons difference spectrum | <br>-in energy range 0,05 – 20,0 keV. |
| 2. | - electrons flux density<br>- protons flux density | -6 in energy ranges, from 0,03 ? ? 6 MeV,<br>-7 in energy ranges, from 0,5 ? ? 600 MeV. |
| 3. | - pitch-angular distribution of<br>electrons flux<br>protons flux | <br>-with energy 0,1 – 1,0 MeV,<br>-with energy 3,0 –30,0 MeV. |
| 4. | - ion atmosphere composition | -in range (1-4) a.u.m. ? (5-20) a.u.m. |
| 5. | - reflected solar radiation | -in range 0,2 – 0,4?m. |

In addition to that “Meteor-M” has an onboard information system and radiocomplex for collecting and transmitting data from ground observation platforms.

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

Therefore this satellite is considered as a future component of space subsystem of the Global Observation System of the World Meteorological Organization.