Russian Meteorological Satellite Systems

Presented at ITSC-19, March 2014
SRC PLANETA, Roshydromet
### Planning of Russian Meteorological Satellite Systems

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#### GEO
- **ELECTRO № 1 (76°E)** — launched on January 20, 2010
- **ELECTRO № 2 (77.8° E)**
- **ELECTRO № 3 (TBD)**

#### HEO
- **ARCTICA-M № 1**
- **ARCTICA-M № 2**

#### LEO
- **METEOR-M № 1** — launched on September 17, 2009
- **METEOR-M № 2**
- **METEOR-M № 2-1**
- **METEOR-M № 2-2**
- **METEOR-M № 3 Oceanographic**
- **METEOR-MP Experimental**
- **METEOR-MP № 1**
METEOR-M General Design

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

Russian meteorological satellite Meteor-M №1 was launched on September, 17th 2009
<table>
<thead>
<tr>
<th>Instrument</th>
<th>Application</th>
<th>Spectral band</th>
<th>Swath-width (km)</th>
<th>Resolution (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSU-MR</td>
<td>Global and regional cloud cover mapping, ice and snow cover observation, forest fire monitoring, …</td>
<td>0,5 – 12,5µm (6 channels)</td>
<td>3000</td>
<td>1 x 1</td>
</tr>
<tr>
<td>KMSS</td>
<td>Earth surface monitoring for various tasks (floods, soil and vegetation cover state, ice cover)</td>
<td>0,4-0,9 µm (3+3 channels)</td>
<td>450/900</td>
<td>0,05/0,1</td>
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<tr>
<td>MTVZA-GY</td>
<td>Atmospheric temperature and humidity profiles, sea surface wind</td>
<td>10,6-183,3 GHz (26 channels)</td>
<td>2600</td>
<td>12 – 75</td>
</tr>
<tr>
<td>IRFS-2</td>
<td>Atmospheric temperature and humidity profiles</td>
<td>5-15 µm</td>
<td>2000</td>
<td>35</td>
</tr>
<tr>
<td>“Severjanin-M”</td>
<td>All-weather Ice coverage monitoring</td>
<td>9500-9700 MHz</td>
<td>600</td>
<td>0,4 x 0,5</td>
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<tr>
<td>GGAK-M</td>
<td>Heliogeophysical data providing</td>
<td></td>
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<tr>
<td>BRK SSPD</td>
<td>Data retransmission from DCP</td>
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</table>
# IRFS-2 Basic Performance Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spectral range: wavelength wave number</td>
<td>µm cm(^{-1})</td>
<td>5-15, 2000-665</td>
</tr>
<tr>
<td>Reference channel wavelength</td>
<td>µm</td>
<td>1.06</td>
</tr>
<tr>
<td>Maximum optical path difference (OPD)</td>
<td>mm</td>
<td>17</td>
</tr>
<tr>
<td>Angular size of FOV</td>
<td>mrad</td>
<td>40 x 40</td>
</tr>
<tr>
<td>Spatial resolution (at sub-satellite point)</td>
<td>km</td>
<td>35</td>
</tr>
<tr>
<td>Swath Width and spatial sampling</td>
<td>km</td>
<td>2500, 110, 2000, 100</td>
</tr>
<tr>
<td>Duration of the interferogram measurement</td>
<td>s</td>
<td>0.5</td>
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<tr>
<td>Dynamic range</td>
<td></td>
<td>2(^{16})</td>
</tr>
<tr>
<td>Mass</td>
<td>kg</td>
<td>45-50</td>
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<tr>
<td>Power</td>
<td>W</td>
<td>50</td>
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</table>

<table>
<thead>
<tr>
<th>Spectral region</th>
<th>Absorption band</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>665 to 780 cm(^{-1})</td>
<td>CO(_2)</td>
<td>Temperature profile</td>
</tr>
<tr>
<td>790 to 980 cm(^{-1})</td>
<td>Atmospheric window</td>
<td>Surface parameters ((T_s), (\varepsilon_v)), cloud properties</td>
</tr>
<tr>
<td>1000 to 1070 cm(^{-1})</td>
<td>O(_3)</td>
<td>Ozone sounding</td>
</tr>
<tr>
<td>1080 to 1150 cm(^{-1})</td>
<td>Atmospheric window</td>
<td>(T_s), (\varepsilon_v); cloud properties</td>
</tr>
<tr>
<td>1210 to 1650 cm(^{-1})</td>
<td>H(_2)O, N(_2)O, CH(_4)</td>
<td>Moisture profile, CH(_4), N(_2)O, column amounts</td>
</tr>
</tbody>
</table>
Noise Comparison:
CrIS, AIRS L1B, IASI L1C and IRFS-2

This figure was based on a figure from: W. Smith, E. Weisz, et al Weather and Climate Applicatons of Ultraspectral IR Radiance Measurements, IRS 2012, 06-10 August 2012, Dahlem Cube, Berlin Germany