# Resurs-P. Capabilities. Standard Products

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Resurs-P is the Russian remote sensing spacecraftdeveloped by JSC "RSC Progress".The operating organization is the Research Center for Earth Operative Monitoring (JSCRussian Space Systems).It is planned to create the group of threespacecraftsResurs – P.

The first spacecraft was placed into orbit on June, 25, 2013.

The spacecraft is designed to update the maps, to support economic activity of MNR of Russia, the Russian Emergency Ministry etc., as well as to receive information for the purpose of control and protection of the environmentand other purposes and consumers.

**The Sensors**

Electrooptical equipment of Geoton – L1 with Sangur – 1 U data-acquisition and conversion system.

Main characteristics:

| | |
|---|---|
| Focal length, mm | 4000 |
| Entrance pupil diameter, mm | 500 |
| Aperture | 1:8 |
| Fieldofview, deg. | 5°18' |
| Pixel size, µm<br>panchromatic<br>spectral | 6x6<br>18x18 |
| GSD:<br>panchromatic, m<br>multispectral, m | 1.0<br>3.0-4.0 |
| Span width, km | 38 |
| Spectral bands, µm:<br>panchromatic<br>blue<br>green<br>red<br>red edge<br>NIR | 0.62-0.79<br>0.48-0.53<br>0.54-0.59<br>0.62-0.68<br>0.72-0.80<br>0.81-0.88 |
| Number of simultaneously used bands | 1-5 |
| Bitperpix | 10 |

**Orbit Parameters**

Main characteristics:

| | |
|---|---|
| Type | Circularsun-synchronous |
| Height, km | 470-480 |
| Inclination, deg. | 97.28 |
| Revisit time, days | 3 |

**Hyperspectral sensor**

Main characteristics:

| | |
|---|---|
| Span width, km | 30 |
| GSD, m | 25-30 |
| Spectral bands, µm | 0.4-1.1 |
| Number of bands | more than 96 |
| Spectralresolution, nm | 5-10 |

**Complex of wide-span multispectral sensors**

Main characteristics:

| Characteristics | Values | |
|---|---|---|
| | Medium resolution | High resolution |
| Opticsystem:<br>Focallength, mm<br>Aperture<br>Fieldofview, deg. | 40<br>1:4<br>54°30' | 200<br>1:3<br>11°70' |
| Span width, km | 441.7 | 97.2 |
| GSD:<br>panchromatic, m<br>spectral, m | 59<br>118 | 12<br>23.8 |
| Spectral bands, µm:<br>panchromatic<br>blue<br>green<br>red<br>NIR 1<br>NIR 2 | 0.43-0.7<br>0.43-0.51<br>0.51-0.58<br>0.60-0.70<br>0.7-0.9<br>0.8-0.9 | |
| Pixel size, µm<br>panchromatic<br>multispectral | 5x5<br>10x10 | |
| bitperpix | 12 | |

**Surveying modes**

Route surveying

Route surveying can be performed with a constant roll and pitch, as well as with specified azimuth. Possible spacecraft roll and pitch deviation from the nadir is up to ± 45 °, by yaw is up to ± 60 °. Duration of routes is from 2 to 300 seconds.
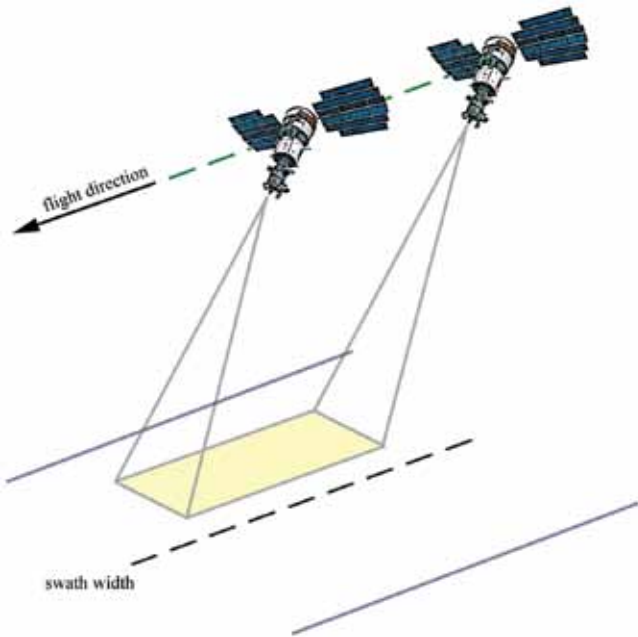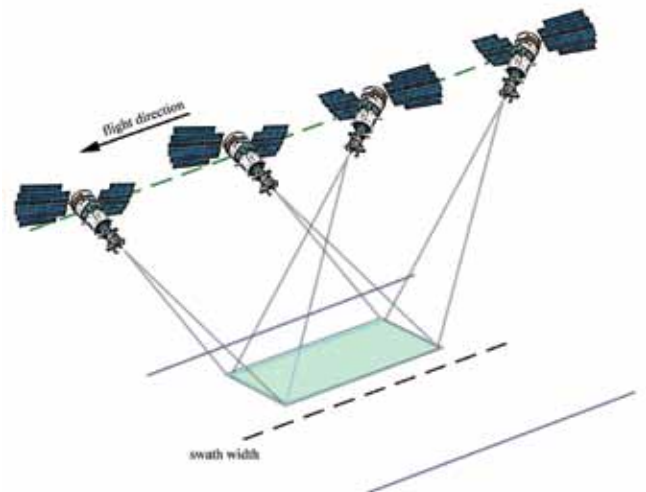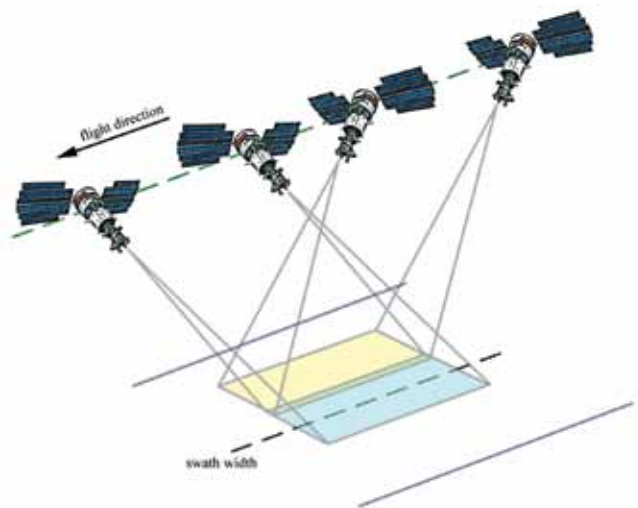


Constant roll and pitch
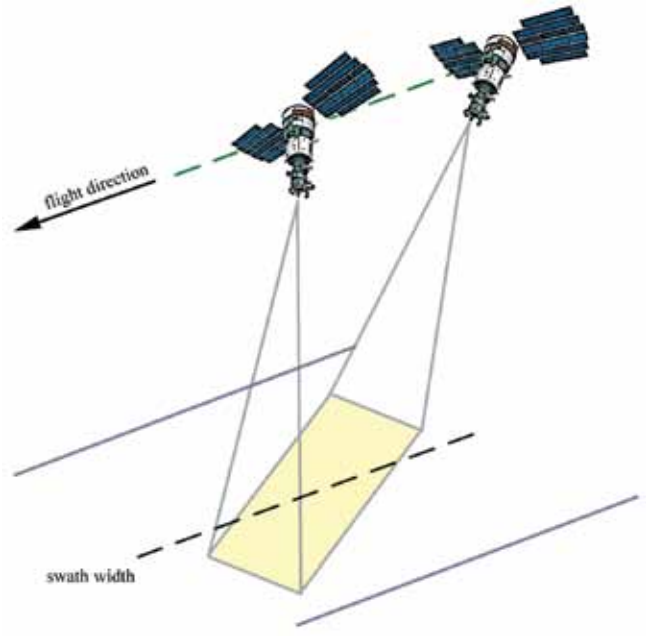


Specified azimuth

**Areal surveying**
**Stereo surveying**





Stereoimaging is performed at a single turn with a deviation by pitch.
Length of routes is up to 115 km.

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**Standard products.**
Sensor Geoton-L1

| Product level | Panchromatic GSD 1m, spectralband 0.62-0.79 μm | Multispectral GSD3 m, spectralbands: 0.48-0.53 μm 0.54-0.59 μm 0.62-0.68 μm 0.72-0.80 μm | Reb bands GSD3 m, spectralbands: 0.66-0.69 μm 0.70-0.75 μm | NIR GSD3 m, spectralband: 0.81-0.88 μm | File format |
|---|---|---|---|---|---|
| 1A | Images by bands withradiometricandgeometriccorrection + RPC. | | | | TIFF, BMP, IMG |
| 1A1 | RGB image with radiometric and geometric correction + RPC | | | | TIFF, BMP, IMG |
| 2A | Images by bands with radiometric and geometric correction + RPC, georeferenced to a cartographic projection, transformed by the average height. Accuracy 30-50 m. | | | | GeoTIFF, IMG |
| 2A1 | RGB image with radiometric and geometric correction + RPC,georeferenced to a cartographic projection, transformed by the average height. accuracy 30-50 m | | | | GeoTIFF, IMG |
| 2B | Images by bands with radiometric and geometric correction, georeferenced to a cartographic projection, transformed by using GCP and DTM. Accuracy dependent on the reference data and DTM. | | | | GeoTIFF, IMG |
| 2B1 | RGB image with radiometric and geometric correction, georeferencedtoacartographicprojecti on, transformed by using GCP and DTM.Accuracy dependent on the reference data and DTM. | | | | GeoTIFF, IMG |
| 3A | Mosaic image of the images 2A1 level. | | | | GeoTIFF, IMG |
| 3B | Mosaic image of the images 2B level. | | | | GeoTIFF, IMG |
| 4A | Pansharpened image (PAN 2A level + MSS 2A1 level) | | | | GeoTIFF, IMG |
| 4B 4B | Pansharpened image (PAN 2B level + MSS 2B1 level) | | | | GeoTIFF, IMG |

## Wide field multispectral sensor (high resolution)

| Product level | Panchromatic GSD 1m, spectralband: 0.62-0.79 μm | Multispectral GSD3 m, spectralbands: 0.48-0.53 μm, 0.54-0.59 μm, 0.62-0.68 μm, 0.72-0.80 μm | File format |
|---|---|---|---|
| 1A | Images by bands withradiometricandgeometriccorrection. | | TIFF, BMP, IMG |
| 1A1 | | RGB image with radiometric and geometric correction. | TIFF, BMP, IMG |
| 2A | Images by bands with radiometric and geometric correction, georeferenced to a cartographic projection, transformed by the average height. Accuracy 50 mforPANand 100 mforMSS. | | GeoTIFF, IMG |
| 2A1 | | RGB image with radiometric and geometric correction, georeferenced to a cartographic projection, transformed by the average height. accuracy 100 m. | GeoTIFF, IMG |
| 2B | Images by bands with radiometric and geometric correction, georeferenced to a cartographic projection, transformed by using GCP and DTM. Accuracy dependent on the reference data and DTM. | | GeoTIFF, IMG |
| 2B1 | | RGB image with radiometric and geometric correction, georeferenced to a cartographic projection, transformed by using GCP and DTM.Accuracy dependent on the reference data and DTM. | GeoTIFF, IMG |
| 3A | Mosaic image of the images 2A level. | Mosaic image of the images 2A1 level. | GeoTIFF, IMG |
| 3B | Mosaic image of the images 2B level. | Mosaic image of the images 2B1 level. | GeoTIFF, IMG |
| 4A | Pansharpened image (PAN 2A level + MSS 2A1 level) | | GeoTIFF, IMG |
| 4B | Pansharpened image (PAN 2B level + MSS 2B1 level) | | GeoTIFF, IMG |

Wide field multispectral sensor (high resolution)

| Product level | Panchromatic | Multispectral | File format |
|---|---|---|---|
| | GSD60 m Spectralband: 0.43-0.70 µm | GSD120 m Spectralbands: 0.43-0.51 µm; 0.51-0.58 µm; 0.60-0.70 µm; 0.70-0.90 µm; 0.80-0.90 µm | TIFF, BMP, IMG |
| 1A | Images by bands withradiometricandgeometriccorrection. | | TIFF, BMP, IMG |
| 1A1 | | RGB image with radiometric and geometric correction. | TIFF, BMP, IMG |
| 2A | Images by bands with radiometric and geometric correction, georeferenced to a cartographic projection, transformed by the average height. Accuracy100 m for PAN and 200 m for MSS. | | GeoTIFF, IMG |
| 2A1 | | RGB image with radiometric and geometric correction, georeferenced to a cartographic projection, transformed by the average height. accuracy200 m. | GeoTIFF, IMG |
| 2B | Images by bands with radiometric and geometric correction, georeferenced to a cartographic projection, transformed by using GCP and DTM. Accuracy dependent on the reference data and DTM. | | GeoTIFF, IMG |
| 2B1 | | RGB image with radiometric and geometric correction, georeferenced to a cartographic projection, transformed by using GCP and DTM.Accuracy dependent on the reference data and DTM. | GeoTIFF, IMG |
| 3A | Mosaic image of the images 2A level. | Mosaic image of the images 2A1 level. | GeoTIFF, IMG |
| 3B | Mosaic image of the images 2B level. | Mosaic image of the images 2B1 level. | GeoTIFF, IMG |
| 4A | Pansharpened image (PAN 2A level + MSS 2A1 level) | | GeoTIFF, IMG |
| 4B | Pansharpened image (PAN 2B level + MSS 2B1 level) | | GeoTIFF, IMG |

## Hyperspectral sensor

| Product level | Surveying by main sensor<br>GSD 30 m<br>Spectral range 0,4-1,1 nm (130 bands) | File format |
|---|---|---|
| 1A | Hyperspectral image with radiometric and geometric correction, with color value at entrance pupil. | TIF, IMG,BMP, |
| 2A | Hyperspectral image with radiometric and geometric correction, with color value at entrance pupil,georeferenced to a cartographic projection, transformed by the average height. Accuracy100 m. | GeoTIFF, IMG |
| 2B | Hyperspectral image with radiometric and geometric correction, with color value at entrance pupil, georeferenced to a cartographic projection, transformed by using GCP and DTM. Accuracy dependent on the reference data and DTM. | GeoTIFF, IMG |